TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT OPERATIONS (Cont.)

f. Drilling, Blasting & Explosives (Cont.)

1. Drilling (Cont.)

Cost of Operating Churn Drills in the Summit Pit, 1935

Feet of Holes Drilled	1,213'
Feet of Holes Lost	32'
Total	1,245'

Operating	Labor	Supplies	Total	Per Foot
Drilling at Mine	$ 1,401.72	366.60	1,768.32	1.457
Sharpening Bits	82.16	21.92	104.08	.085
Pipe & Fittings		20.96	20.96	.017
Rope		46.00	46.00	.037
New Drill Bits		74.24	74.24	.061
Electric Power		123.67	123.67	.100
Truck & Tractor	99.78	35.23	135.01	.110
Total	$ 1,583.66	688.62	2,272.28	1.867
Maintenance Drills	55.58	76.39	131.97	.113
Total Operating and Maintenance	$ 1,639.24	765.01	2,404.25	1.980
Building Roads	322.06	119.87	441.93	

Combined Cost of Operating Churn Drills - 1935

	Total Net Footage	Total Cost	Cost Per Foot
West Pit	6,851	$ 13,610.43	$ 1.98
East Pit	691	1,770.46	2.56
Summit Pit	1,213	2,404.25	1.98
Total	8,755	$ 17,785.13	$ 2.03

2. Blasting

Six primary blasts were made during the year of which three were at the West Pit, two were at Summit Pit and one at the East Pit. An increasing proportion of higher strength powder is being used each year to reduce secondary blasting to a minimum, and decrease the throw of each blast so that the amount of track shifting is also reduced. The blast results in tabular form follow:

91

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT
OPERATIONS (Cont)

f. Drilling, Blasting & Explosives (Cont.)

2. Blasting (Cont.)

Blast Number	Location	Date	No. of Holes	Footage	Pounds Powder	Est. Tons	Tons Ore per lb. powder
1	West Pit	1-9-35	3	296	2,100	6,000	3.0
2	" "	6-14-35	38	1,818	12,550	40,000	3.2
3	East Pit	8-19-35	5	448	3,400	12,000	3.4
4	West Pit	9-3-35	13	1,199	9,250	30,000	3.2
5	Summit Pit	9-27-35	22	490	2,100	6,000	2.9
6	Summit Pit	10-15-35	5	140	750	2,000	2.7

The secondary blasting cost at the Summit Pit was excessive because of the necessity of reducing the size of each piece of ore to go through the 5/8 yd. Erie shovel dipper. Loading efficiency comparable to the transportation facilities will be realized only when a larger shovel is placed in operation at this pit. A large amount of secondary blasting was necessary in the west portion of the West Pit in removing hard toe sections and levelling the floor. The results of this work should be evident in 1936 in a lowered blasting and loading cost at this pit.

STATEMENT OF COST OF EXPLOSIVES USED FOR YEAR ENDING DECEMBER 31,1935

Primary Blasting

Kind	Quantity	Price	Amount
Gelamite #2	7,900 lbs.	$ 12.25	$ 967.75
40% LF Gelatine	6,000 "	10.90	654.00
60% LF "	5,650 "	12.50	706.25
80% LF "	10,300 "	16.25	1,673.75
90% LF "	3,150 "	18.75	590.63
Total Powder	33,000 lbs.	13.91	4,592.38
Blasting Supplies			
Plain Cordeau Bickford Fuse	1,504 ft.	42.06	63.17
Double " " "	5,004 "	48.45	242.25
Total	6,508 ft.		$ 305.42
TOTAL COST			$4,897.80

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT
OPERATIONS (Cont.)

2. Blasting (Cont.)

Total Ore Blasted in 1935	96,000 tons
Pounds of Powder per Ton of Ore	.33
Cost per Ton for Powder	.047
Cost per Ton for Fuse, Caps, etc	.003
Cost per Ton for all Explosives	.050
Average price per Pound for Powder	.139

Secondary Blasting

Kind	Quantity	Price	Amount
60% Gelatine	5,259 lbs.	$ 12.50	$ 656.50
Blasting Supplies			
Connecting Wire	23 ft.	.40	9.20
Hot Wire Lighters - 7"	800 "		6.41
Crescent Fuse	33,200 "	.57	189.74
No. 6 Blasting Caps	5,200 "	1.12	58.24
Total	39,223 "		$ 263.59
Total Cost			$ 920.09

Product	190,511
Pounds of Powder per Ton of Ore	.027
Cost per Ton for Powder	.003
Cost per Ton for Fuse, Caps, etc	.001
Average price per Pound for Powder	.125

Combined Total Blasting Cost

Kind	Quantity	Price	Amount
Gelamite #2	7,900 lbs.	$ 12.25	$ 967.75
40% LF Extra Gelatin	6,000 "	10.90	654.00
60% LF Extra Gelatin	10,900 "	12.50	1,362.75
80% LF Extra Gelatin	10,300 "	16.25	1,673.75
90% LF Extra Gelatin	3,150 "	18.95	590.63
Total Powder	38,250 "	13.72	5,248.88

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT
OPERATIONS (Cont.)

2. Blasting (Cont).

WEST PIT	Tons
Broken Ore remaining year 1934.....	57,579
Blasted 1935, Primary Blast 76,000 tons	
" 1935, Secondary " 20,000 "	96,000
Total.....	153,579
Ore shipped in 1935 - 145,457 tons	
Rock Wasted in 1935 - 1,810 ".....	147,267
Estimated ore on hand Dec.31,1935.....	6,312

EAST PIT	
Broken Ore remaining year 1934.....	34,050
Blasted in 1935.....	12,000
Total.....	46,050
Ore Shipped in 1935.....	40,575
Estimated Ore on hand Dec.31,1935...	5,475

SUMMIT PIT		
Tons Blasted.....		8,000
Tons dumped as trestle anchorage	1,790	
Contaminated ore dumped as R.R.fill	90	
Tons ore shipped	4,479.....	6,359
Balance of ore in Pit Dec.31,1935.....		1,641

3. Statement of Cost of Drilling and Blasting 96,000 tons of Ore

Feet of Holes Drilled - 4,161',
Plus 472' in 1934.

Drilling Cost Operating	Labor	Supplies	Total	Cost Per Ft.	Cost Per Ton
Drilling at Mine	$ 3,330.40	1,667.65	4,968.05	1.193	
Sharpening Bits	311.15	80.53	391.68	.094	
Pipe & Fittings		91.37	91.37	.021	
Rope		314.77	314.77	.075	
New Drill Bits		325.73	325.73	.078	
Electric Power		425.02	425.02	.102	
Truck & Tractor	306.17	122.97	429.14	.103	
Total Operating	$ 3,917.72	3,028.04	6,945.76	1.666	
Maintenance					
Drill Sharpener	22.41	2.23	24.64	.005	
Drills	173.83	154.99	328.82	.079	
Total Maintenance	$ 196.24	157.22	353.46	.084	

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT OPERATIONS (Cont.)

3. Statement of Cost of Drilling & Blasting (Cont.)

	Labor	Supplies	Total	Cost Per Ft.	Cost Per Ton
Total Operating and Maintenance	$ 4,113.96	3,185.26	7,299.22	1.75	
472' drilled in 1934			902.24	1.77	
Total Drilling			8,201.46	1.77	.085
Primary Blasting Cost					
Labor Loading Holes	213.07		213.07		
Explosives		4,591.27	4,591.27		
Other Supplies		102.70	102.70		
Total Blasting	213.07	4,693.97	4,907.04		.051
Total Opt.Maintenance and Primary Blasting	$ 4,327.03	7,879.23	12,206.26		
Roads Extraordinary Summit Pit	333.00		333.00		.004
GRAND TOTAL	$4,660.03	7,879.23	13,441.50		.140

Classification of the above cost under the heading for each pit is as follows:

	Number Holes	Combined Cost	Tons	Cost Per Ton
West Pit	51	$ 9,496.69	76,000	$ .125
East Pit	5	1,760.15	12,000	.146
Summit Pit	m 29	2,184.66	8,000	.273
Total	85	$ 13,441.50	96,000	$ .140

The large number of shallow holes which produced the small tonnage at the new Summit Pit is clearly reflected in the higher cost per ton.

g. Loading Operations

The shipping season was opened on the 13th of April when #29 shovel started loading operations at the West Pit. Production was intermittent, and by this one shovel only, until the middle of July.

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT
OPERATIONS (Cont.)

g. Loading Operations (Cont.)

The small production resulted in an unusually high operating cost during these first several months and it was not until #31 shovel started loading in the East Pit that the cost was reduced to normal Single shift operations with one shovel in each pit was continued to September 15th, on which date operations were placed on a double shift basis because of the accelerated loading schedule. #31 shovel was moved to the West Pit Sept. 22nd to maintain the increased production of regular silica grade by mixing ore from different sections of this pit. The Summit Pit was added to the production list late in September, the ore being stockpiled on the floor of the East Pit after filling and anchoring the dumping trestle. On the 18th of October, #31 shovel was returned to the East Pit and in less than three days had loaded out the 4,479 tons stockpile of Summit ore while the remainder of the mine was idle. This was followed by intermittent loading by #29 shovel in the West Pit until the shovel was disabled by a broken frame casting on November 10th. The following day #31 shovel was moved again from the East Pit, completed the loading program at the West Pit on November 15th and was then available for assistance in replacing the broken casting in #29 shovel.

The three blasts which were necessary at the West Pit to maintain the grade of ore necessitated a good deal of track shifting. The cleaning up of the dike contaminated material and the large amount of secondary blasting in the west portion of the Pit, also added to the expense, but by far the largest single item in the increased shovel operating cost was the total electric power charge which was .04 per ton as compared to .029 in 1934. This represented a cost of .0296¢ per K.W.H. in 1935 and .023¢ per K.W.H. in 1934. Both seem excessive in view of the fact that the charge is about double that of an underground mine.

The necessity of opening the low phosphorus Summit Pit at an elevation of 120' above the floor of the other two pits presented a rather unusual operating problem. At first thought the method of lowering the cars down an incline track by means of a hoist and cable would seem to be the solution. Equipment had to be provided however so that 50 tons (a standard railway car) could be run through the crushing plant at one time for shipment from the pocket. The first cost of haulage equipment of this

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT
OPERATIONS (Cont.)

g. Loading Operations (Cont.)

capacity was prohibitive, so the idea was discarded in favor of a level track to the top of the East Pit face, down which the ore would be dumped to be stockpiled on the pit floor 120' below. In following this procedure a cargo of ore was accumulated as previously noted, and put through the crushing plant with no interference from other pit operations and no danger of contamination of the low phosphorus content. The first cost of drilling and blasting the Summit Pit ore was about double the normal cost because of the low initial loading face. This cost will be reduced in the next blast. The cost of secondary blasting and loading this ore was exceedingly high because it was impossible to load more than 200 tons per shift with the undersized 5/8 yd. Erie steam shovel as compared to an average of 800 to 1,000 tons production from one of the 2½ yd. electric shovels. This in turn increased the cost of all other operations at this pit for the year, with the exception of the reloading charge in the East Pit. To show the need for proper loading equipment at this pit and for purposes of comparison, the following cost table is introduced:

Cost of Loading & Shipping 4,479 Tons of Low Phos.Ore,1935

	Labor	Supplies	Total	Cost Per Ton	Tilden Mine Inc.Summit Pit, 1935
Drilling & Blasting 4,479 tons @ .273 per ton			$ 1,222.76	.273	.14
Secondary Drilling	$ 172.80	100.00	272.80	.061	.01
Operating Erie Shovel	$ 387.76	222.31	610.07	.136	.034
Operating Locomotive	262.52	165.44	427.96	.095	.030
Dumping Ore	36.32		36.32	.008	-
Pumping, etc.	144.00		144.00	.032	.001
Trackmen	126.72		126.72	.029	.010
Total	$ 957.32	387.75	1,345.07	.300	
Cost per ton stockpiled in East Pit				.634	.236
Operating #31 Elec.Shovel	$ 52.40	25.00	77.40	.017	
Operating Locomotives	83.60	51.80	135.40	.030	
Total	$ 136.00	76.80	212.80	.047	
Total cost per ton at crushing plant				.681	.236

97

TILDEN MINE
ANNUAL REPORT
YEAR 1935

7. OPEN PIT OPERATIONS (Cont.)

g. Loading Operations (Cont).

The difference in cost is clearly demonstrated and it may be noted that, other factors being equal, the sole added production cost for the Summit Pit ore will be the East Pit ore loading charge which in 1935 was 4.7¢ per ton. This cost is easily justifiable because of the non-interference of the Summit operation with the production of silica grade. Under the other system of lowering the cars, a higher transportation cost and an almost impossible operating situation at the crushing plant would have resulted.

8. COST OF OPERATING

a. Comparative Mining Costs

	1935	1934	Increase	Decrease
Production	190,511	167,688	22,823	
Average Daily Product	1,432	1,537		105
Tons per man per day	45.75	50.91		5.16
Number of days Operating	133	109		24
Number of shifts and hours	77-1-8 hr. 22 2-8 hr.	1-8 hr.		
Cost				
Pit Operating Accounts	.295	.273		
Pit General Accounts	.040	.041		
Cost at mine per cost sheet	.335	.314		
Depreciation				
Plant and Equipment	.045	.077		
Taxes	.027	.030		
Stripping	.005	.016		
Grand total cost at mine	.412	.437		
Idle Expense	.071	.052		
Grand total cost at mine	.483m	.489		
Expense Beyond Mine				
Freight - Rail	.640	.640		
Lake Freight	.760	.760		
Cargo Insurance & Analysis	.010	.010		
Shrinkage	.011	.011		
TOTAL COST LOWER LAKES	1.90	1.91		

TILDEN MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

b. Detailed Cost Comparison

1. Days and Shifts

The mine operated on a curtailed basis during the first half of the shipping season at a cost which was higher than normal because of the operation of only one shovel. Operations were then placed on a double shift basis because of the accelerated loading schedule and at the end of the shipping season a total of 133 eight hour shifts had been worked as compared to 109 in 1934.

2. Production

The 1935 production showed an increase of 22,823 tons over 1934. The average daily product, however, decreased 105 tons per day because of the curtailed schedule early in the season and because of the cleaning up of the West Pit later in the season in preparation for a large blast in the spring of 1936.

3. Cost of Production

The year 1935 shows a decrease in cost on cars over 1934 of .006. This was principally due to the decreased depreciation charge of .032 which more than offset the increased pit operating cost of .022 per ton. The detailed cost follows:

4. Open Pit Costs

	1935	1934	Increase	Decrease
Shifts and Hours	77-1-8 hr.	1-8 hr.		
Production, Tons	190,511	167,688	22,823	
Average daily product	1,432	1,537		105
Number of days worked	133	109	24	

PIT OPERATIONS DIRECT ORE	1935 Amount	1935 Per Ton	1934 Amount	1934 Per Ton	Increase Amount	Increase Per Ton	Decrease Amount	Decrease Per Ton
1. Drilling & Blasting.....	28,364.86	.149	23,647.26	.141	4,717.60	.008		
2. Electric Shovels Operating.....	6,510.54	.034	4,464.73	.027	2,045.81	.017		
3. Electric Shovels Maintenance.....	2,023.87	.010	2,706.49	.016			682.62	.006
4. Locos.& Cars Operating.....	5,629.80	.030	4,516.94	.027	1,112.86	.003		
5. Locos. & Cars Maintenance.....	414.22	.002	210.26	.001	203.96	.001		
6. Tracks,Expense...	1,839.49	.010	1,414.50	.009	424.99	.001		
TOTAL DIRECT ORE	44,782.78	.235	36,960.18	.221	7,822.60	.014		

TILDEN MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING (Cont.)

GENERAL PIT EXPENSE	1935 Amount	1935 Per Ton	1934 Amount	1934 Per Ton	Increase Amount	Increase Per Ton	Decrease Amount	Decrease Per Ton
8. Water Supply.....	154.49	.001	21.86	.001	132.63			
10. Crushing & Screening.	7,678.59	.040	6,102.86	.037	1,575.73	.003		
11. General Open Pit Exp.	2,162.31	.011	1,598.52	.011	563.99			
12. Open Pit Supts.....	1,176.00	.007	955.96	.004	220.04	.003		
14. Waste Pile Expense...	219.88	.001	49.61	.000	170.27			
Total General Pit Exp...	11,391.27	.060	8,728.81	.052	2,662.46	.008		
Total Pit Operation.....	56,174.05	.295	45,688.99	.273	10,485.06	.022		
GENERAL MINE EXPENSE								
17. Insurance.....	84.42	.001	70.82	.000	13.60			
18. Mining Engineering...	952.44	.005	430.31	.003	522.13	.002		
19. Mech.& Elec. Engrg...	491.10	.002	384.56	.003	106.54			.001
20. Analysis & Grading...	2,009.38	.011	1,678.76	.010	330.62	.001		
21. Personal Injury.....	862.29	.005	669.98	.004	192.31	.001		
22. Geological.....	214.10	.001	61.47	.000	152.63	.001		
23. Safety Department,...	36.11	.000	40.00	.000			4.00	
24. Welfare Expense.....	339.00	.001	415.83	.003			76.83	.002
25. Special Expense.....	377.00	.002	566.55	.004			189.55	.002
26. Ishpeming Office.....	700.00	.004	1,070.00	.006			370.00	.002
28. Mine Office.....	1,605.57	.008	1,247.23	.006	358.34	.002		
29. Saranac Invest.Exp...	56.57	.000	268.51	.002			211.94	.002
Total General Mine Exp..	7,727.98	.040	6,904.02	.041	823.96			.001
Cost of Production.....	63,902.03	.335	52,593.01	.341	11,309.02	.021		
30. Deprn.Plant & Equipt.	8,625.31	.045	12,911.98	.077			4,286.67	.032
31. Amortization Strip...	952.56	.005	2,683.01	.016			1,730.45	
32. Taxes.....	5,148.98	.027	5,117.00	.030	31.98			.003
Cost at Mine.....	78,628.88	.412	73,305.00	.437	5,323.88			.025
33. Inventory Adjustment..	10.86	.000			10.86			
34. Idle Expense.....	13,457.82	.071	8,700.10	.052	4,757.72			
TOTAL COST AT MINE....	92,097.56	.483	82,005.10	.489	10,092.46			.006

1. Drilling and Blasting

76,000 tons of ore were drilled and blasted in the West Pit; 12,000 tons of ore in the East Pit, and 8,000 tons of ore in the Summit Pit in 1935. The increased cost, .008 per ton, is due to the increased cost of drilling in the Summit and East Pits.

TILDEN MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

2. Electric Shovels - Operating
The increased cost was due principally to the higher cost per KWH and the increased cost per ton. The electric power cost in 1934 was .029 and in 1935 .04.

3. Electric Shovels - Maintenance
The decreased cost per ton of .006 was due to less repairs in 1935. The electric shovels were thoroughly overhauled and repaired in the winter months of 1934.

4. Locomotives and Cars - Operating
The increased cost per ton of .002 was due to additional cost account of operating #1 locomotive at Summit Pit in October 1935.

5. Locomotives and Cars - Maintenance
The increase of .001 per ton was due to repairs to #1 locomotive.

6. Track Expense
Increase of .001 per ton was due to moving the loading track twice in the West Pit, and once in the East Pit, and putting in switch and track in the west end of the West Pit.

10. Crushing and Screening
The increased cost of .003 per ton was due to the increased cost of electric power.

12. Open Pit Superintendence
The increased cost per ton of .003 was due to more time being worked by the mine foreman.

14. Waste Pile Expense
The increased cost of .001 per ton was due to cleaning up 1,810 tons of dike in the West Pit at the end of the shipping season.

18. Mining Engineering
The increased cost of $522.13 and the increased cost per ton of .002 is principally on account of the mining engineer being employed as a shift boss during the double shift operations.

101

TILDEN MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING (Cont.)

b. Detailed Cost Comparison (Cont.)

20. Analysis and Grading
The increased cost of $330.62 and .001 per ton is due to extra sampling of low phosphorus ore from the Summit Pit.

21. Personal Injury
The increased cost was $192.31 and .001 per ton. There was only one lost time accident this year.

24. Welfare Expense
This is a distributive account, the decreased cost per ton being due to the larger tonnage.

25. Special Expense
This is a distributive account from the Ishpeming Office. Decreased cost per ton being due to larger tonnage.

26. Ishpeming Office
This is a distributive account from the Ishpeming office. Decreased cost per ton due to smaller charge and increased tonnage.

28. Mine Office
The increased cost of $358.34 and .002 per ton is due to more clerk's time being charged to this account.

29. Saranac Investigation
Decreased cost of $211.94 on this account and .002 per ton. This is a distributive account from the Ishpeming office.

32. Taxes
Decreased charges and increased tonnage shows a decrease of .003 per ton.

34. Idle Expense

	Labor	Supplies	Total
January.....	$ 1,408.49	1,380.83	2,789.32
February.....	1,125.79	1,999.30	3,125.09
March.....	1,413.68	1,586.87	3,000.55
April.....	918.69	626.71	1,545.40
December.....	1,078.49	1,918.97	2,997.46
Total.....	$ 5,945.14	7,522.68	13,457.82

TILDEN MINE
ANNUAL REPORT
YEAR 1935

9. EXPLORATIONS AND FUTURE EXPLORATIONS

An authorization, E&A #680, was approved, and work was started late in the year on a drilling campaign in the area south of the present Tilden West Pit. Here a large swamp lays between the granite footwall of the Marquette Range to the south, and the hillside silicious ore workings to the north. Conditions seem favorable to the possibility of higher grade material at depth. The preliminary standpiping and shallow drilling in the swamp, upon which the deeper program will be based, was started in December with Hole #48. At the end of the year the standpipe had encountered the jasper ledge at a depth of 56'. The next hole will be placed farther south in an attempt to locate the footwall contact at ledge.

10. TAXES

Tilden Township Tilden Mine	1935 Valuation	 Taxes	1934 Valuation	 Taxes
N½ of Sec.26,47-27	$ 145,000	3,696.05	125,000	3,418.26
Personal,Supplies,Equipt.	55,000	1,401.95	60,000	1,640.94
Total	200,000	5,098.00	185,000	5,059.20
Collection Fees		50.98		50.59
Total Tilden Mine		5,148.98		5,109.79

11. PERSONAL INJURY

One non-serious lost time accident spoiled a perfect record for the year. In preparing the 7 yd. dump cars for use at the Summit Pit, the frame sideboards had to be replaced due to rot. The car repairman's axe struck a knot in trimming one of the new planks, glanced off and cut his foot. The injury was slight, the man losing only 3½ days. The accident was non-compensable and the date of occurrence Sept. 4.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

The large amount of new construction covering railways, power lines, pipe lines, dam, trestle, etc. in opening the new Summit Pit are covered in detail under other headings in this report. If suitable loading equipment is provided at this pit, it may be considered as being on a regular operating basis so that no additional construction is contemplated at present.

TILDEN MINE
ANNUAL REPORT
YEAR 1935

13. EQUIPMENT AND PROPOSED EQUIPMENT

a. Shovels and Crushers

The shovels and crushing plant operated throughout the season with a minimum of lost time as may be noted in the statement of delays. The sole recommendation in this regard is that an additional shovel, comparable to #29 or #31 electric shovel, be purchased for use at Summit Pit. That this expenditure is justifiable and expedient has already been noted under the heading "Loading Operations".

14. MAINTENANCE AND REPAIRS

The regular winter maintenanceand repair program was already underway at the end of the year. The broken caterpillar frame casting had been replaced in #29 shovel and the boom let down for renewal of cracked plate. Heavier sections will be installed as replacements, after which cracks in the swing frame sections will be welded. The electrical equipment in this shovel and #31 will need only minor repairs because of the thorough overhauling they received last year. Boiler repairs are necessary on Nos. 2 and 4 locomotives in addition to regular maintenance. Several of the Easton duplex car bodies will be repaired with new bed plates and the 7 yd. dump cars at Summit Pit need only minor repairs to put them in good condition for next year.

The largest item in crushing plant repairs will be the installation of the two lower rings of concaves in the 42" gyratory crusher. The two 10" crushers were provided with new concaves late in the operating season so that bearing renewals and a general overhauling will be sufficient to put them in good condition. The same is true of the grizzley, conveyor and pocket gates.

15. POWER

The increased cost of electric power was discussed under loading operations and it may be repeated here that a cost of nearly 3¢ per K.W.H. seems excessive at an operation the size of the Tilden. This cost compares with the residential lighting rate in the City of Ishpeming and is about double that of an underground mine.

16. WATER SUPPLY

The water supply is adequate except in the case of a prolonged dry spell. Some difficulty was experienced at the Summit pit operation until the independent supply was abandoned and this pit served with water through the air line from the main water tank.

TILDEN MINE
ANNUAL REPORT
YEAR 1935

18. NATIONALITY OF EMPLOYEES

	American Born	Foreign Born	Total
English	17	6	23
Norweigan.....	2		2
Finnish.....	13	2	15
Swedish.....	8	1	9
Irish.....	5		5
French-Canadian.....	1		1
Total	46	9	55

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

1. GENERAL:

The Negaunee Mine operated on a two day per week schedule from January 1st to February 11th when the working time was increased to three (3) days per week. The mine actually operated four (4) days each week to February 11th with two crews of men, one crew worked the first four days of the week, the other crew worked four days the following week. On the three day per week schedule, starting February 11th, the mine operated six (6) days each week with one-half the crew working each day. The surface crew works on Monday, Wednesday and Friday. Operation of the mine six days each week permits rapid headway in mining which decreases repair costs. With two crews of men only one-half as much equipment is required reducing the investment in this material 50%. To these advantages must be added the spreading of employment.

Special repair work gave part of the crews extra time each week. The extra time has been given to men owing hospital bills and back rent and in this way they have been able to clean up many of these accounts. Usually only part of the earnings for the extra time worked has been applied on the debts.

Shipments from stockpile in 1935 were 219,673 tons as compared with 51,151 tons in 1934. Most of the ore in stock under the steel trestles was removed assuring ample stocking room this winter even if the operating schedule is increased.

The work of enlarging airways between levels which was started in 1934 was completed in 1935. The volume of air forced through the mine is now close to the full capacity of the fan at No. 2 shaft or 100,000 cu. ft. per minute. The course of the air on the levels is controlled by doors which divert it into connections to the various operating sub levels. More fresh air in each working place has improved conditions by lowering the humidity and providing the normal amount of oxygen. The working places are now cool and comfortable for the miners and the rate of rotting of timber has also decreased.

During the year there were two lost time accidents only one of which was serious. The men are constantly warned to avoid dangerous methods of doing work and this is undoubtedly making them more safety conscious. The educational work can never stop for most of the accidents are due to carelessness. A number of meetings of foremen at the Athens and Negaunee Mines have been held at the Superintendent's office at which accidents and mining standards are discussed. Particular attention is given at these meetings to standards that have been violated and also to discipline.

The average number of men employed on the two crews at the mine during the first six months of 1935 was 230, during the last six months it was 235. The increase over the last six months of 1934 was one for the first half of 1935 and six for the second half. The increase was mainly due to taking on a few men account of developing the 13th level.

The cost of repair work was practically the same as in the previous year. The work of replacing timber sets on the main levels and recribbing raises due to rotting of timber, accelerated by the idle periods of 1932 and 1933 still continues. General repairs however, such as retimbering of connecting drifts on sub levels and airways and retimbering over raises on the operating sub levels has shown a decrease. This has been due to distribution of the mining contracts over a wider territory.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

1. GENERAL: (Cont'd)

Development of the 13th level was started in February and continued during the year. Good progress was made and at the end of the year approximately one-third of the total drifting had been completed, 1,400 ft. out of a total of approximately 4,000 ft. Three raises had been started in No. 2 cross-cut and two main level drifts were advancing, one in ore and one in rock. Development of this level added approximately five cents ($.05) per ton to the cost of ore produced in 1935. Development will continue during 1936.

I regret to report the death of Captain Fred Ware on September 27th at the age of 63 following a few days illness with pneumonia. He had not fully recovered his strength following a severe operation early in the year. He had resumed his work as Captain but planned to retire early in the winter. In Captain Ware's death the Company has lost a valuable and loyal employe. He had an unusual record for long continuous service as he had been Captain at the Negaunee Mine for 28 years. He was liked and respected by the men at the mine as well as by all the mining men in the Lake Superior District. He had unusual success in picking men and placing them on the job best suited to their ability. This faculty coupled with his sound judgment and unusual ability as a miner made him a very valuable mining captain. The new Captain, Richard Cattron, was trained by Captain Ware. For the past several years he had been Underground Foreman or Second Captain at the Negaunee Mine.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1935	1934	Increase	Decrease
Negaunee Bessemer Ore	-	1,105		1,105
Negaunee Ore	291,318	234,559	56,759	
Total Ore	291,318	235,664	55,654	
Rock	20,128	5,112	15,016	
Total Hoist	311,446	240,776	70,670	

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Negaunee Bessemer Ore	-	-	-	1,105
Negaunee Ore	142,852	219,673	362,525	148,696
Total	142,852	219,673	362,525	149,801
Total Last Year	98,650	51,151	149,801	
Increase	44,202	168,522	212,724	

Shipments increased 142% in 1935 and were 71,207 tons more than the product for the year.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION, SHIPMENTS & INVENTORIES:

c. Stockpile Inventories:

	Dec. 31, 1935	Dec. 31, 1934	Decrease
Negaunee Ore	127,197	198,404	71,207

Including estimated overrun there was approximately 155,000 tons in stock at the end of the year.

d. Division of Product by Levels:

The ore hoisted from the various levels was as follows:

	1935		1934	
	Tons	%	Tons	%
10th Level	-		2,410	1.0
11th "	106,508	36.6	108,058	45.9
12th "	183,362	62.9	125,196	53.1
13th "	1,448	.5	-	
Total	291,318	100.0	235,664	100.0

e. Production by Months:

The production by months was as follows:

Month	Bessemer	Negaunee Ore	Total	Rock
January	0	16,882	16,882	1,280
February	0	18,874	18,874	516
March	0	24,399	24,399	2,304
April	0	24,945	24,945	1,972
May	0	27,070	27,070	1,608
June	0	23,365	23,365	1,120
July	0	26,486	26,486	1,528
August	0	25,481	25,481	1,976
September	0	25,380	25,380	2,464
October	0	27,382	27,382	2,132
November	0	24,217	24,217	1,984
December	0	26,837	26,837	1,244
Total	0	291,318	291,318	20,128
Total 1934	1,105	234,559	235,664	5,112
Increase		56,759	55,654	15,016
Decrease	1,105			

The product by leases was distributed as follows:

	1935	1934	Increase
Negaunee Mine Co.	268,882	215,268	53,614
American Mining Co.	22,436	20,396	2,040
Total	291,318	235,664	55,654

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Cont'd)

f. Ore Statement:

	Negaunee Ore	Total 1935	Total 1934
On Hand Jan. 1, 1935	198,404	198,404	112,541
Product for Year	291,318	291,318	235,664
Overrun	0	0	0
Total	489,722	489,722	348,205
Shipments	362,525	362,525	149,801
Balance on Hand	127,197	127,197	198,404
Increase in Output		55,654	
Decrease in Ore on Hand		71,207	

1935 - 1 8-hour shift, 4 days per week, Jan. 1st to Feb. 11th.
1 8-hour shift, 6 days per week, Feb. 11th to Dec. 31st.

1934 - 1 8-hour shift, 6 days per week, Jan. 1st to Sept. 4th.
1 8-hour shift, 4 days perwweek, Sept. 4th to Dec. 31st.

g. Delays:

There was no time lost in 1935 account of delays.

h. Delays from Lack of Current:

There were no delays from lack of current in 1935.

3. ANALYSIS:

a. Average Mine Analysis on Output:

	1935				1934			
Grade	Tons	Iron	Phos.	Silica	Tons	Iron	Phos.	Silica
Negaunee Ore	291,318	61.32	.114	6.34	234,559	61.30	.104	6.26

b. Average Analysis on Straight Cargoes:

		Mine			Lake Erie	
Grade	Tons	Iron	Phos.	Silica	Iron	Moisture
Negaunee Ore	174,678	61.33	.110	6.18		None

4. ESTIMATE OF ORE RESERVES:

A. Developed Ore:

Assumptions: 12 cubic feet equals one ton
10% deducted for rock
10% deducted for loss in mining
Percentage of Bessemer - none

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

4. ESTIMATE OF ORE RESERVES: (Cont'd)

a. Developed Ore: (Cont'd)

Above 9th Level:		
No. 1 Shaft Pillar	1,148,681 tons	
No. 2 " "	113,906 "	
Total Above 9th Level		1,262,587 tons
Between 10th and 11th Levels		551,934 "
Between 11th and 12th Levels		1,451,756 "
Total developed ore above 12th Level 12/31/35		3,266,277 "

No new ore was developed in 1935. All ore below the 12th level is considered as prospective ore and is not included in the estimate of ore reserves. It will be included as soon as the 13th level is fully developed.

In prior years it was estimated that a small percentage of the ore reserves would be Bessemer grade. In order to control the phosphorous in the output it is now considered advisable to include all the low phosphorous ore in the Negaunee grade.

c. Estimated Analysis:

Ore Reserves: Approximate Expected Natural Analysis:

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Neg.	53.20	.102	6.10	.210	2.60	1.00	.320	.011	1.94	12.00

Ore in Stock: Average Natural Analysis:

	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
Neg.	54.28	.096	5.61	.200	2.57	.600	.380	.011	1.86	11.33

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

From January 1st to February 11th the mine operated four (4) days each week with two crews of men. Thus each man worked two (2) days per week or an average of about nine (9) shifts per month. This did not give them enough income in the winter and in February a three day a week schedule was adopted which was continued for the balance of the year. Some extra time was allowed on repair work so that on the three day schedule most of the miners averaged 14 or 15 shifts per month instead of 13 the normal number for a three day schedule. Part of the extra earnings were credited to back rent and hospital bills.

There has been no labor turnover at the mine since the depression started and there has always been a large waiting list of idle men. Efficiency under these conditions has been above normal. One serious problem in the community has been the lack of work for the sons of employees. In large families this has caused hardships as one wage earner is not able to properly cloth and feed the entire family. As a whole the men have been fairly well satisfied with the three day a week working schedule in effect since February 11th. There is however, a general feeling that times are improving and that the working schedule will soon be increased to four (4) days per week.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

5. LABOR AND WAGES: (Cont'd)

a. Comments: (Cont'd)

(2) New Construction:

There were no Estimates & Authorizations in 1935.

b. Comparative Statement of Wages and Product:

	1935	1933	Increase	Decrease
PRODUCT	291,318	235,664	55,654	
No. Shifts and Hours	1 8-hour	1 8-hour		
AVERAGE NO. MEN WORKING:				
Surface	45	42	3	
Underground	190	179	11	
Total	235	221	14	
AVERAGE WAGES PER DAY:				
Surface	4.30	4.23	.07	
Underground	5.14	4.94	.20	
Total	4.95	4.78	.17	
AVERAGE WAGES PER MONTH:				
Surface	75.71	67.58	8.13	
Underground	73.90	61.36	12.54	
Total	74.25	62.36	11.89	
PRODUCT PER MAN PER DAY:				
Surface	30.64	29.26	1.38	
Underground	8.88	8.83	.05	
Total	6.89	6.79	.10	
LABOR COST PER TON:				
Surface	.141	.145		.004
Underground	.578	.559	.019	
Total	.719	.704	.015	
AVERAGE PRODUCT MINING:				
Stoping	24.64 Tons	21.60 Tons	3.04 Tons	
Ore Development	8.65 "	9.52 "		.87 Tons
Total	24.36 "	21.45 "	2.91 "	
AVERAGE WAGES CONT. LABOR	6.06	5.60	.46	
TOTAL NUMBER OF DAYS:				
Surface	9,509½	8,055	1,454½	
Underground	32,785½	26,671½	6,114¼	
Total	42,295½	34,726½	7,569	
AMOUNT FOR LABOR:				
Surface	40882.80	34064.50	6818.30	
Underground	168513.14	131770.73	36742.41	
Total	209395.94	165835.23	43560.71	

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

5. LABOR AND WAGES: (Cont'd)

b. Comparative Statement of Wages and Product: (Cont'd)

AVERAGE WAGES PER MONTH AS PER LABOR STATEMENT, LESS CAPTAIN AND CLERKS:

	1935	1934	Increase
Surface	72.36	63.50	8.86
Underground	72.86	60.22	12.64
Total	72.76	60.80	11.96

15% increase in wages effective July 16th, 1933.
10% increase in wages effective April 1st, 1934.

The increase in surface crew in 1935 was due to inclusion on the mine labor statement of the hours worked in the General Shops at Ishpeming for the Negaunee Mine. These hours were equivalent to three men. The underground crew was increased 11 men account of developing the 13th level.

Proportion of Surface to Underground Men:

1935: 1 to 4.22 -- 1 8-hour shift, 2 days per week
January 1st to February 11th.
1 8-hour shift, 3 days per week
February 11th to December 31st.

1934: 1 to 4.26 -- 1 8-hour shift, 3 days per week
January 1st to September 4th.
1 8-hour shift, 2 days per week
September 4th to December 31st.

6. SURFACE:

a. Buildings, Repairs:

In the fall the roof of the shop building was repaired and given a treatment of primer and sealcote. An application of these materials to the asbestos roof covering usually lasts four or five years and eliminates leaks.

The roof of the office building was also given a treatment of primer and sealcote after renailing the old roof. All leaks were eliminated.

A new steel stack was erected in September on a concrete base between the two boilers in the heating plant. Heretofore two stacks were necessary, one for each boiler.

The shaft house enclosure at the collar of the shaft was extended three feet to the north and south of the cage and skip compartments to provide more room for the examination of skips and cage, etc. This expense was incurred to safeguard the men from accidents when making inspections, oiling skips, examining skip and cage ropes and testing the cage. Another unexpected advantage has been the automatic control of ventilation in the two shaft compartments. Heretofore in the winter the cage road has been upcast and the skips downcast. In severe winter weather ice formed and it was necessary to cover the shaft at night. Since enlarging the enclosure the air currents reverse many times daily and thus all danger from ice in the shaft has been eliminated.

During the year a number of ties on the west steel stocking trestle were replaced. The old ones had rotted after 10 years or more service.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

6. SURFACE: (Cont'd)

b. Stockpiles:

The ore in stock under the west steel trestle was shipped in 1935 and also nearly all the ore under the east steel trestle. There is ample stocking room available for stocking this winter even if production is increased.

b-1. Rock Trestle:

The rock trestle erected in 1934 northeast of the shaft was extended two bents in March, seven bents in May and seven bents in October. It has now reached the caved area and sufficient stocking room has been provided until next summer. Considerable rock is being hoisted due to the development of the 13th level.

c. Tracks, Roads:

There was no expense in 1935 for tracks or roads.

d. Water Supply:

The cost of water purchased from the City of Negaunee and used at the mine for the last seven years was as follows:

	1935	1934	1933	1932	1931	1930	1929
1st Quarter	44.31	47.39	54.25	58.11	104.72	180.01	257.57
2nd "	62.98	76.80	36.00	68.68	57.41	175.71	279.79
3rd "	61.51	75.85	52.14	51.25	76.41	219.47	305.55
4th "	62.55	35.98	36.29	40.43	46.55	147.36	173.39
Total	231.35	236.02	178.68	218.47	284.99	722.55	1016.30
Product Tons	291,318	235,664	61,761	84,046	338,696	579,740	555,919
Cost Per Ton	.000794	.001001	.002893	.0026	.00084	.00124	.00182

The cost per ton in 1935 was the lowest in the past seven years. Rainfall during the summer made it unnecessary to water the lawn.

e. Grounds:

The grounds around the mine were kept in good condition during the summer. The shrubbery was pruned, the beds cleaned and the lawns kept mowed.

7. UNDERGROUND:

a. Shaft Sinking:

There was no shaft sinking in 1935.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

b. Development:

Development work was underway all the year. It was mainly confined to the 13th level. On the upper levels a few raises were put up and several drifts driven in ore and rock for ventilation. There were an average of two gangs on rock work during the year.

Development in Rock

In March and April the plat was excavated on the 13th level and the main haulage drift started toward the ore body. The plat extends 165 ft. north of the shaft and is excavated wide enough for three tracks, two for timber and one to the loading pocket. The haulage drift has since been extended over 1,200 ft. in rock to the ore body which was reached in December. The haulage drift branched to the east about 965 ft. from the shaft. This branch is called the footwall drift and the extension of the main drift to the northwest, No. 2 cross-cut. The footwall drift had advanced 90 ft. in rock at the end of the year. A small pump house was excavated in rock west of the plat. It is 15' x 15' in size. A short distance beyond the north end of the plat or 200 ft. north of the shaft a drift was driven on a curve to the west for 40 ft. Ground has been excavated on the north side of this drift for a scraper hoist opposite to which point sinking on an incline had been completed at the end of the year. to the elevation of the sump. The sump will be excavated in 1936. Actual rock drifting on the 13th level exclusive of the plat, pump house and incline to sump totaled 1,130 ft. for the year. This is roughly 30% of the total anticipated rock drifting on this new level.

Three raises in No. 2 cross-cut on the 13th level had been started at the end of the year and the combined footage in rock was 49 ft.

On the 11th level a new raise, No. 1104, was extended 25 ft. in the hanging wall jasper to reach the elevation of the next sub level in this area.

On the 370' sub level elevation a ventilation and traveling drift was driven in the footwall jasper a distance of 101 ft. to connect No. 1209 raise to No. 1271 raise. Prior to this a rock drift had been driven 115 ft. back in the footwall from No. 1209 raise, a raise put up 42 ft. to the 11th level elevation and a drift driven 25 ft. in rock to hole to the 11th level east footwall drift. A total of 241 ft. of rock drifting and 42 ft. of raising was done here to provide ventilation for the sub levels opened from the 1270 and 1260 series of raises.

Early in the year No. 4 cross-cut on the 12th level was extended 55 ft. in rock and 20 ft. in ore to complete the connection to No. 5 cross-cut. The connection was made to improve ventilation and prevent rotting of timber. The ground here has slabbed very badly and it has been impossible to keep the new drift entirely open.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

b. Development: (Cont'd)

On the 475' sub level there was 16 ft. of rock drifting and 24 ft. of rock raising to make a connection to the 10th level for a ventilation and traveling road to the 475' sub and subs opened later at lower elevations in this ore body on the south footwall. In connecting the raises on this sub level it was necessary to drift 89 ft. in the hanging wall jasper which drops down in the center of the ore body.

On the 395' sub level a drift was driven 25 ft. in the footwall and a connection made to the 11th level for ventilation and a traveling road.

Early in the year No. 1287-A raise in No. 8 cross-cut was extended in rock 80 ft. and 20 ft. in ore to the elevation of the 395' sub level. This raise was put up to mine the north footwall pillar on the 395' and 385' sub levels.

Development in Ore

There was slightly more development in ore in 1935 than in the previous year. In both years it was much below normal due to the shutdowns in 1932 and 1933 and the low rate of production in effect since 1931.

On the 11th level, No. 1104 raise was put up in ore 44 ft. and then 25 ft. in the hanging to the elevation of the 460' sub level. No. 1115-A raise was put up 80 ft. in ore to the 488' sub level to replace two raises that had caved.

On the 395' sub level there was 10 ft. of ore drifting to hole a ventilation drift and traveling road to the 1270 series of raises.

On the 12th level, No. 1256-A raise in No. 5 cross-cut was extended 65 ft. in ore to the elevation of the 370' sub level. This raise replaced two raises that had crushed. No. 4 cross-cut on the 12th level was advanced 20 ft. in ore to hole to No. 5 cross-cut.

Lean ore was encountered in No. 2 cross-cut on the 13th level in December. This is the same lean ore area that has been found lying on the south footwall of the main ore body north of No. 2 dike on every level. The grade of the ore gradually improved as No. 2 cross-cut advanced and the last 84 ft. driven in December was included in the ore product. It averaged from 56% to 58% in iron.

No. 1325 raise on the 13th level in No. 2 cross-cut was started late in December in lean ore. Before the end of the year it had encountered ore in which it had advanced 29 ft. on December 31st.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

c. Stoping:

Mining in 1935 was confined to the same areas as in 1934. Ore was mined during the year on the 3rd, 4th and 5th subs below the 10th level on the north footwall, on the 3rd sub below the 10th on the south footwall, on the 1st, 2nd and 3rd subs below the 10th level in the area between No. 1 and No. 2 dikes and the main ore body from the 11th level on the north footwall to the 4th sub below the 11th on the hanging wall side.

It will be noted that mining was spread over a number of sub levels, especially so when it is considered that only 23 contracts were engaged in ore production. The plan of spreading mining operations over a large area which was started in 1934 was continued during 1935. The advantages gained by this plan were much more apparent than in 1934. Crushing has been materially reduced both on the sub levels and the main levels, ventilation has improved and hazards incidental to mining have been reduced. Under the plan each gang mines the area controlled by two and in some cases three raises. One gang therefore mines an area from 70 ft. to 100 ft. in width, the usual area mined per gang on each sub level averages approximately 1800 sq. ft. Often the center raise of three contiguous raises will not be used which permits of longer slices from the other two raises. The old system was three slices from each raise with raises 35 ft. apart, the new system is more nearly six or more slices from raises 70 ft. apart. Two gangs on a sub level approximately 300 ft. in length by 150 ft. in width with from six to eight raises start mining on the hanging side from No. 1 and No. 3 or No. 4 raise. Fresh air enters on the footwall side. The drift connecting the series of raises is double propped and stays open usually for the entire life of the sub level while under the old system with six or more gangs on a sub level it would have had to be retimbered at least once and often twice. The ore is now mined by radial slicing against a solid pillar except the last slice which removes the ore to the area mined some time previously by the other gang on the sub. The mined area therefore has had sufficient time to settle and pack before the first gang removes the last slice adjoining it. It appears that blasting by one or two contracts does not effect the main level drift beneath the sub level to any extent while under the old system with six or more contracts blasting at different places on one sub level often all at one time, frequently caused large masses of ground to loosen above the main level timber. This caused heavy pressure to be thrown on the timber and often break-downs and runs of ore or rock occurred. Separation of the mining gangs has reduced the hazards from blasting and to a certain extent from falls of ground and runs of jasper through the mat.

Two crews of men and the relatively small number of gangs mining ore together with the large developed ore body has made it possible to separate the mining contracts at this property. It has been demonstrated by two years trial that this change in the plan of mining has increased output (tons per man stoping), reduced repair costs and increased safety.

During 1935 there was an average of 23 contracts on ore production, the average by division into the three general operations was as follows: Slicing 18; drifting 4; cutting out in raises 1 - total 23.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

Detail of Stoping

500' Sub Level - South Footwall

During the first three months of the year the small ore body found in 1934 as a riser in the hanging near No. 2 dike was mined by one gang of miners. It was approximately 80' x 30' in size. A large amount of hanging jasper was then blasted down to make a mat or cushion above the area mined. For safety it is considered that 20' to 30' of broken jasper must be provided in a new area under the hanging after which the hanging rock usually breaks and fills the open space as the area is extended by mining operations on lower sub levels.

488' Sub Level - South Footwall

Mining on this sub level was in the same area described in the previous paragraph. The ore body increased in size due to flattening of the hanging. Mining was completed here in July after which more filling was blasted down to form a mat under the new hanging.

475' Sub Level - South Footwall

Mining was in progress on this sub level in two areas, namely, between No. 1 dike and the south footwall and between No. 1 and No. 2 dikes. The first area is approximately 275' x 100' in area, the second 300' x 160'. Two contracts mined all the year in the first area and four in the second area. Both areas are wet, especially the one between the two dikes and pressures are heavy. The area mined on the 500' and 488' subs described in the two preceding paragraphs constituted the west end of the area between the two dikes on this sub level. Mining of the two areas on this sub level will be completed early in 1936. Ventilation is provided by a connection to the 10th level footwall drift.

475' Sub Level - North Footwall

Mining of this area on the north footwall was originally started in 1933 and was nearly completed at the end of 1934. The last pillars were removed early in 1935.

460' Sub Level - North Footwall

Mining was started on this sub level in the fall of 1934 and was nearly completed at the end of 1935. This sub level is approximately 270' x 140' in size; early in the year three contracts mined here. Later one was removed and in October another, leaving one at the end of the year to finish mining the last few small pillars. Ventilation is provided by a connection to the 10th level.

450' Sub Level - North Footwall

Mining was started in the north footwall pillar in October by one contract which moved down from the 460' sub level. At the end of the year the three raises in the south series had been connected and mining started. A connection has also been made to the raise to 10th level to provide for ventilation on this new sub level.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

11th Level

Mining of the main ore body at the elevation of the 11th level was started in 1928 and has been continuous until in August of this year when mining of the small area left on the north footwall was completed. There was no mining adjacent to this area during 1935 and for the first time in many years heavy pressures did not interfere with mining operations here.

During 1935 two raises were put up in ore to the 460' and 475' sub level elevations from the haulage drift between No. 1 and No. 2 dikes.

395' Sub Level - Main Ore Body

This sub level was originally opened in the main ore body in 1929 and mining was still underway in the last half of 1935 in the north central footwall pillar. At this elevation the pillar is approximately 300' x 100' in area; it is being mined by two contracts. At the end of the year three small pillars remained to be mined after which there will be no further mining at this elevation until the north and south footwall pillars now being mined at some distance above the 11th level are mined to this elevation. Fresh air enters this sub via a raise and rock drift in the footwall directly from the 11th level footwall drift.

385' Sub Level - Main Ore Body

Mining on this elevation was started in 1930 in the main ore body at the extreme southwest end under the hanging and has been in progress since that time. In 1935 mining was under way from the 1260 and 1270 series of raises above Nos. 6 and 7 cross-cuts on the 12th level. There are seven raises in No. 7 cross-cut and eight in No. 6 with three gangs mining above No. 7 and two above No. 6 cross-cut. Ventilation is provided in both areas by direct connection to the main airway on the 11th level. The new system of mining was particularly effective on this sub level. Under the old system there would have been at least 10 or 12 contracts working from the two sets of raises while under the new system there has only been four the greater part of the year. The pillars between the working places have therefore been larger and the connecting drifts have required very little repairs. In December five contracts were working here; the 1260 area was about 80% mined and the 1270 area about 50%.

370' Sub Level - Main Ore Body

This sub level was first opened in 1931 in the main ore body when a small area under the hanging was mined. Two transfer systems were in use for mining on this sub level in 1932 but they did not work satisfactorily due to a heavy flow of water from the area being mined collecting on the transfer sub and effecting the ore from all the contracts using the system. In 1934 mining was started near the Maas boundary in the area adjacent to the 1290 and 1290-A series of raises and continued in this area during 1935. It is approximately 300' x 200' in size with 14 raises so that the three contracts working here average approximately four raises each. At the end of the year two-thirds of the area had been mined. Only part of the raises are used, usually every other one as this plan increases the length of slices and reduces delays due to moving from one raise to another.

MEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

370' Sub Level - Main Ore Body (Cont'd)

In 1935 mining in the area controlled by the 1250 series of raises above No. 5 cross-cut on the 12th level was started by two gangs of miners and at the end of the year 50% of this area had been mined. A total of five gangs of miners are working on the 370' sub level elevation.

A rock drift was driven from No. 1209 raise on the east footwall side of the main ore body nearly 100 ft. in the footwall, a raise put up to the 11th level elevation and a connection made to the 11th level. After this work was finished a connection was driven from No. 1209 to No. 1271 raise also in the footwall. This provided a traveling and ventilation road to the 1270 series of raises on the 385' sub level and will also serve the sub levels opened at lower elevations in this area. A drift was also driven south through No. 2 dike from No. 1250 raise and a raise put up to the 11th level to provide for ventilation in the 1250 and 1260 series of raises.

360' Sub Level - Main Ore Body

There was no mining at this elevation prior to 1933 except a ventilation drift near the Maas boundary. Mining above the 1240 and 1230 series of raises, started in 1933 under the hanging, was continued during 1934 and 1935. At the end of the year mining in this area had been practically completed. One gang of miners were removing the last two small pillars near No. 1241 raise at the end of December and will finish here early in January 1936.

350' Sub Level - Main Ore Body

In July this sub level was opened at No. 1247 raise and a connecting drift driven to No. 1248 raise. This sub level is within 40 ft. of the 12th level and soon after work started here No. 4 cross-cut on the 12th and these two raises started to crush so badly that it was decided to abandon this part of the territory until the new raises from the 13th level to this territory were finished after which mining will be resumed here.

12th Level

There was comparatively little work on this level in 1935. A connection started in 1934 between No. 4 and No. 5 cross-cuts was completed early in 1935. The connecting drift was driven in jasper with a few feet in ore near where it holed to No. 5 cross-cut. This drift has since caved in spite of heavy propping due to pressure and the action of the air on the lime seams in the formation. Due to the early completion of raises from the 13th level which will hole to No. 3 cross-cut nearby it is no longer necessary to keep this part of No. 4 cross-cut open.

In 1935 two raises were put up from the 12th level; one in rock and ore to the 395' sub level from No. 8 cross-cut and one in ore in No. 5 cross-cut to the 370' sub level elevation.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (CONT'D)

c. Stoping: (Cont'd)

13th Level

Development of this level was started with the partial cutting of the plat in 1931. No further work was done until in 1933 when the tail drift was driven 120 ft. south of the loading pocket at the shaft, also 50 ft. of the main haulage drift was driven north of the pocket after which work was again stopped until in February 1935. During this month preparations for resumption of work here were completed, and actual work was started in March. Work was underway for the balance of the year. The plat was first cut, a pump house excavated and drifting started toward the ore body. During this period the broken rock was handled directly to the pocket with a 25 H.P. scraper hoist. Tracks were then installed, also trolley lines after which a locomotive and two cars were brought to the level. A steel scraper slide was installed for loading rock into the tram cars. Drifting was resumed and continued without interruption for the balance of the year. The main drift advanced in slate at a rate of over 200 ft. per month until jasper was encountered 820 ft. north of the shaft. Timbering of the drift was then started which delayed progress somewhat. After advancing 40 ft. in jasper No. 2 cross-cut was turned off and the footwall drift was also driven far enough so that work could be resumed here later without interference with operations in No. 2 cross-cut.

No. 2 cross-cut was continued in jasper to the dike which was encountered 140 ft. north of the switch. The dike was 40 ft. thick which was evidence that No. 1 and No. 2 dikes had come together to form one dike as they were each never over 15 ft. to 20 ft. in thickness on the upper levels and no other dike was encountered in No. 2 cross-cut. The advance beyond the dike was in lean ore for some distance then the grade started to improve and during the last half of December the ore was included in the product. At the end of the year No. 2 cross-cut was in 270 ft. beyond the dike and nearly around the curve to the southwest where it will be continued parallel with the Maas boundary.

Three raises at 50 ft. centers have been cut out and late in December two contracts started to raise to the 350' sub level elevation about 40 ft. above the 12th level where mining will be started.

Late in December a new steel scraper slide was installed in the footwall drift and work resumed here. This drift had advanced 90 ft. in jasper and slate from the turnout at the end of December.

Provision was made last March to protect the men from dust. Air line respirators were provided for each man, also water for a water curtain and for wetting down the broken rock, also the walls of the drift were washed down every day. A 1500 cu. ft. fan sucked out the dust and foul air from the breast and discharged it into the cage compartment of the shaft which was upcast. Analysis of the air for dust particles and determination of the silica content were made at regular intervals. In fact every precaution was taken to safeguard the men developing the level from inhalation of dust with a high silica count.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

c. Stoping: (Cont'd)

13th Level (Cont'd)

In addition to the drifting program a ditch was excavated as the drift advanced, tracks installed and also a 4" air line. Air lock doors have been installed in the drift with concrete frames. These doors will control the air when a connection is made in February 1936 to the 12th level. The roof of the plat over the loading pocket at the shaft was concreted in an arched form and a concrete pillar put in near the shaft with steel rails for caps across the back of both drifts to the north end of the pillar. This work was necessary on account of the loose, slabby ground near the shaft. The balance of the plat was then gunited also all the drift to the jasper contact nearly 800 ft. from the shaft. The gunite will prevent the slate from air slacking and timbering will not be necessary.

Treated timber was used in the jasper, lean ore and ore drifts and all scrap 40 ft. rail in the mine was cut in 7 ft. lengths and used in place of poles between the sets to support the back lagging. There was enough rail to use in several hundred feet of drift before the supply was exhausted.

Every effort was made to have all installations on the level as permanent as possible to avoid replacements in the future.

d. Timbering:

The expense for retimbering due to the idle periods in 1932 and 1933 and the low operating schedule in effect the past few years will not be overcome for years. It materially increased the cost of repairs to raises and main level drifts during 1935.

A comparison of the cost for timber in 1935 and 1934 shows a small decrease in 1935. The decrease is due to less repairs on sub levels and at tops of raises on account of less crushing. It is believed that the change in detail of method of mining (wider distribution of contracts) is responsible for the decrease. Some large hemlock stulls have been received at the mine to try out in comparison with the 10" to 14" hardwood. They run from 14" to 24" in diameter and will be used for legs in areas where the pressure is unusually heavy. These large sizes cost no more than the 12" to 14" hardwood and may last longer. Timber used per ton of ore decreased slightly in 1935 as also did the cost per ton for timber. Included in the 1935 costs is an item of approximately $625.00 for treated timber used on the 13th level.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

d. Timbering: (Cont'd)

Statement of Timber Used:

	Linear Feet	Avg. Price Per Foot	Amount 1935	Amount 1934
6" to 8" Cribbing	40,516	.0350	1,418.18	1,809.42
8" Stulls	37,701	.0522	1,969.24	1,949.75
10" "	75,850	.0785	5,953.74	4,078.59
12" "	33,719	.1062	3,580.66	3,475.26
14" "				328.31
Treated Timber	2,868	.2218	635.73	
Total 1935	190,618	.0712	13,557.55	
Total 1934				11,641.33
Lagging - 7 ft.	846,035	.694	5,876.91	5,359.42
Poles - 9½ ft.	624,498	1.153	7,202.26	6,035.34
Total 1935	1,470,533	.890	13,079.17	
Total 1934				11,394.76
Wire Fencing - rods	350	.854	298.97	405.82
Grand Total - 1935			26,935.69	
Grand Total - 1934				23,441.91

Product	291,318	235,664
Feet of Timber per ton of ore	.654	.7002
" " Lagging per ton of ore	2.90	3.24
" " " " ft. of timber	4.44	4.63
" " Wire fencing per ton of ore	.0198	.0334
Cost per ton for timber	.0466	.0494
" " " " lagging	.0202	.0227
" " " " poles	.0247	.0256
" " " " wire fencing	.00102	.0018
" " " " total	.0924	.0995
Equivalent of stull timber to board measure	445,910	387,839
Feet of board measure per ton of ore	1.53	1.65

Total Cost for Timber, Lagging, Poles, etc.

Year	Product	Amount	Cost Per Ton
1935	291,318	26,935.69	.0924
1934	235,664	23,441.91	.0985
1933	61,941	9,147.82	.1477
1932	84,046	8,988.22	.1069
1931	338,696	33,408.70	.0986

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

e. Drifting and Raising:

There was a large increase in drifting in 1935 due to development of the 13th level, but there was less raising. The net increase in drifting and raising was 171%. The increase in cost per ton for this development work as compared to 1934 was $.054 - expressed in another way this was practically the increase in cost per ton account of opening the 13th level.

	Drifting		Raising		
Year	Ore	Rock	Ore	Rock	Total
1935	114'	1855'	258'	241'	2468'
1934		248'	419'	244'	911'
Increase	114'	1607'			1557'
Decrease			3'	171'	

The above figures do not include the footage of rock work done entirely to improve ventilation which will be reported under ventilation nor does it include some footage excavated in connection with the sumps on the 10th and 13th levels which will be reported under sumps.

f. Explosives, Drilling and Blasting:

The average price paid per pound for powder increased 2.6% in 1935 but even with the increase it was lower than in the years preceding 1934 in which year it reached the lowest price in 20 years. The following statement gives a comparison of costs, etc., for the past five years:

Year	Cost per Lb. For Powder	Lbs. Powder Per L Ton of Ore	Cost Per Ton Powder	Cost Per Ton Fuse & Caps	Total Cost
1935	.1168	.4270	.0498	.0102	.0600
1934	.1140	.4350	.0507	.0106	.0613
1933	.1196	.5110	.0610	.0130	.0740
1932	.1235	.4191	.0518	.0099	.0617
1931	.1268	.4025	.0510	.0091	.0602

The above table shows a lower consumption of powder per ton of ore than in the two preceding years but slightly higher than in the years prior to 1933. The cost per ton of ore for powder in 1935 and 1934 was the lowest in the five year period. It compares quite closely with the cost in 1930. The cost per ton of ore for fuse and caps was slightly lower than in the two preceding years. The total cost for all explosives was the lowest in the five year period and almost the same as in 1930.

It is believed that the decrease in cost is due to more slicing and less drifting in ore. This condition has been brought about by more radial slicing and longer slices as a result of the changes in mining practice whereby the contracts are given a larger area to mine on each sub level. There continues to be some areas in the mine where the ore is tough and hard to break in which the cost per ton for explosives runs from 50% to 100% above the average. It is probable that these areas will decrease in size and number as greater depth is attained for usually the lower part of the ore body is softer than in the top or close to the hanging.

MEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

f. Explosives, Drilling and Blasting: (Cont'd)

Statement of Explosives Used: (Ore Development and Stoping)

	Quantity	Average Price	Amount 1935	Amount 1934
50% Gelatin	123,590	11.66	14,416.67	11,676.75
60% "	700	14.28	100.01	266.87
Total Powder - 1935	124,290	11.68	14,516.68	
Total Powder - 1934				11,943.62
Fuse - feet	376,019	5.72	2,152.60	1,857.47
Caps - No. 6	61,249	11.23	688.19	562.21
Tamping Bags	29,500	2.48	73.10	48.26
Fuse Lighters	6,700	6.75	45.23	36.46
Total Fuse, etc. - 1935			2,959.12	
Total Fuse, etc. - 1934				2,504.40
Total All Explosives - 1935			17,475.80	
Total All Explosives - 1934				14,448.02
Product			291,318	235,664
Pounds of powder per ton of ore			.427	.435
Cost per ton for powder			.0498	.0507
Cost per ton for fuse, caps, etc.			.0102	.0106
Cost per ton for all explosives			.0600	.0613

Sinking, Rock Development, Etc.

50% Gelatin	8,850	11.75	1,038.71	
60% "	24,100	12.50	3,012.50	
Total Powder - 1935	32,950	12.29	4,051.21	
Fuse - feet	57,271	5.72	327.62	
Caps - No. 6	8,851	11.23	100.04	
Total Fuse, etc. - 1935			427.66	
Total explosives for Rock Drifting - 1935			4,478.87	
Total explosives for Rock Drifting - 1934				578.91
Total Explosives used in mine			21,954.67	15,026.93
Avg. Price per lb. for Powder			.1181	.114

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

g. Mining and Loading:

A detail of the method of mining by the top slicing system has been changed at the Negaunee Mine during 1934 and 1935. It is described in this report under stoping. Briefly stated it calls for wider distribution of contracts or fewer contracts on a sub level, more raises for each contract and longer slices. It has reduced repair costs, increased output, reduced stoping costs and eliminated some hazards. It will take a longer time to get full and complete data on results but they all appear to be favorable in the short time it has been tried out. As a result of the evident advantages of this plan the layout of the 13th level cross-cuts and raises has been changed to conform with it. Fewer raises will be necessary and one cross-cut has been eliminated. This will reduce development expense materially.

It was thought for many years that rapid extraction of the ore on a sub level with as many gangs working as could be crowded together would reduce repair costs, etc. The new plan gives rapid extraction of ore in two or three separated areas on the sub level. This insures larger pillars between working places instead of cutting up all the sub level at one time into small pillars. Continued study will be given the plan in 1936.

All the ore is handled by electric scraper hoists on the sub levels. Over three-fourths of the units are 15 H.P. and less than one-fourth 10 H.P. Both work satisfactorily but for long slices the 15 H.P. hoist is necessary. No more 10 H.P. units will be purchased on account of mining by longer slices.

h. Ventilation:

Ventilation has been better maintained during 1935 than in any prior year in the mine's history. This is a strong statement but actual measurements of the volume of fresh air entering the mine is proof - over 90,000 cu. ft. per minute during most of 1935 as compared with from 60,000 to 70,000 in prior years. This coupled with an actual connection to nearly all the sub levels direct from the main airways has insured every miner an ample supply of fresh air.

During 1934 and for several months in 1935 enlargement of airways was underway. Part of the expense incurred in this work was paid by the Maas Mine as they were directly benefited by enlargement of the raises carrying fresh air from one main level to the next level. Early in 1935 the new airway raise in rock from the 10th to 9th level was completed and then stripped to 8' x 8' in size. On completion of this raise a rock raise from the 11th to the 10th was enlarged to 8' x 8' in size. The minimum area of the openings between levels has been set at 120 sq. ft. or approximately equal to two 8' x 8' raises. Any smaller area reduces the amount of fresh air per minute due to back pressure. Openings equal to 120 sq. ft. or larger have been provided between all the levels at the Negaunee Mine down to the 12th. The connections to the Maas Mine do not nearly equal this area but plans are underway to provide more openings in 1936.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

h. Ventilation: (Cont'd)

Ventilation expense in 1935 ($6,658.17 - .023 per ton) was lower than in 1934 ($7,696.65 - .033 per ton) both in cash cost and cost per ton due to less expense for enlargement of airways and less expense for electric current.

The work remaining to be done at the end of 1935 was as follows:

Gunite the 6-1/2 and 9th level rock drifts to prevent slabbing.
Permanent airway raises in rock from the 13th to the 12th levels as soon as the level is developed to the site of the raises.

i. Pumping:

The number of gallons pumped per minute in each month of the year for the past five years are shown in the following statement:

Month	1935	1934	1933	1932	1931
January	931	815	814	942	990
February	953	788	808	982	914
March	899	779	751	963	891
April	878	796	816	973	878
May	887	807	926	1000	847
June	895	826	876	835	960
July	911	837	984	918	972
August	917	854	882	885	923
September	936	857	889	889	953
October	944	859	866	786	931
November	940	875	849	920	839
December	927	876	826	771	875
Total Average	918	831	857	905	914

There was an increase in gallons of water pumped per minute for the first time since 1929 and the increase over 1934 of 87 gallons per minute brought the total back to nearly the same amount as was pumped in 1931. In the mine, the 475' sub level in the area between No. 1 and No. 2 dikes and from No. 1 dike to the footwall is perhaps a little wetter than in previous years, also the 360' sub level under the hanging above the 12th level showed water for the first time in the spring of 1935. The rainfall in 1935 was not above normal. There were no dry periods in the summer as is usual and the rainfall was fairly evenly distributed over the year. The increase was probably due to breaking away of the hanging and extension of the main cave to the west and south with new cracks in the overlying rock through to surface in this area. This has undoubtedly extended the drainage area and thus brought more water to the mine.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND: (Cont'd)

i. Pumping: (Cont'd)

The following statement shows gallons pumped per minute for the past ten years:

Year	Gallons Per Minute
1935	918
1934	831
1933	857
1932	905
1931	914
1930	1060
1929	1230
1928	1198
1927	1144
1926	819

j. Underground in General:

The mine was in good condition at the end of the year. There were no areas under unusual pressure and the repair work was confined to the normal replacement of rotted timber on the levels and rotted cribbing in the raises. Extensive repairs to the 12th level raises opened four to seven years ago is naturally to be expected and at the end of the year this comprised the largest repair program. With good ventilation now assured the rate of rotting of timber should decrease and in time effect a saving in repair costs. The mine is kept clean at all times at some cost but it is more than repaid by teaching the men to be orderly, by increased safety and efficiency.

k. Sumps:

The only expense in 1935 in connection with the sumps was incurred on the 10th and 13th levels. On the 10th level some ground was excavated in a stub drift from which an incline leads down to the sump. Tracks were installed and a slide built in preparation for enlarging the main sump. Additional capacity is necessary to insure 12 hour storage. Pumping is now done on two 8-hour shifts at night so as to keep the pumping load off the regular day shift load. This has lowered the 15 minute demand peak, increased the load factor and lowered the cost per K.W. for current. The ninth level drifts are now used for storage but with the recent increase in water some additional reserve capacity is advisable. This work will be undertaken in 1936.

In addition to excavating a small pump house on the 13th level preparations were made to excavate a sump. A stub drift was driven in 40 ft. from the haulage drift at a point 200 ft. north of the shaft, ground excavated for a scraper hoist station and the incline excavated down to the sump level 12 ft. below the main level. It is planned to make a small sump on the 13th as not much water will reach this level. Mining at the Maas is at a lower elevation along the boundary so that no water will come from the north, also most of the Negaunee Mine water is caught on the footwall on the upper levels. It is planned to complete this sump in 1936. Expense incurred in this work on the 10th and 13th levels was charged to maintenance, pumping machinery.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING:

a. Comparative Mining Costs:

	1935	1934	Increase	Decrease
PRODUCT	291,318	235,664	55,654	
Underground Costs	1.059	1.056	.003	
Surface Costs	.136	.159		.023
General Mine Expenses	.241	.275		.034
Cost of Production	1.436	1.490		.054
Taxes	.357	.323	.034	
Depletion & Depreciation	.353	.353		
Loading & Shipping	.022	.010	.012	
Adm. & General Expense	.031	.042		.011
Miscellaneous Income	.017	.016	.001	
TOTAL COST	2.182	2.202		.020
No. of Days Operated	303	273	30	
No. of Shifts & Hours	1-8	1-8		
Average Daily Product	961	863		

COST OF PRODUCTION:

	1935	%	1934	%	Increase		Decrease	
Labor	.742	51.7	.731	49.0	.011	2.7%		
Supplies	.694	48.3	.759	51.0			.065	2.7%
Total	1.436	100.0	1.490	100.0			.054	

b. Detailed Cost Comparison :

(1) Days and Shifts:

Year	Days Mine Worked	Shifts & Hours	Men Employed	Total Shifts Worked
1935	303	1-8	235	42,295½
1934	273	1-8	221	34,726½
Increase	30		14	7,569

(2) Wages:

There was a 10% increase in wages effective April 1st, 1934.

(3) Comparison of Production:

Production - 1935	291,318
Production - 1934	235,664
Increase	55,654

(4) Comparison of Number of Men and Wages:

	No. Men	No. Days	Amount	Rate Per Day
1935	235	42,295½	209,395.94	4.95
1934	221	34,726½	165,835.23	4.78
Increase	14	7,569	43,560.71	.17

(5) Tons Per Man Per Day:

	1935	1934	Increase
Surface	30.64	29.26	1.38
Underground	8.88	8.83	.05
Total	6.89	6.79	.10

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)

(6) Cost of Production:

1935	418,315.71	Cost per ton	1.436	
1934	351,165.74	Cost per ton	1.490	
Increase	67,149.97	Decrease	.054	

	Labor	%	Supplies	%
1935	216,156.02	51.7	202,159.69	48.3
1934	172,338.80	49.0	178,826.94	51.0
Increase	43,817.22		23,332.75	

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)
b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

	1935	1934	Increase	Decrease
Days Per Week	4 & 6	4 & 6		
Shifts & Hours	1-8	1-8		
Production, Tons	291,318	235,664	55,654	
Avg. Daily Product, Tons	961	863	98	
Number of Days Worked	303	273	30	

	Underground Costs	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
1.	Exploring in Mine	118.66	.000	25.13		93.53			
2.	Sinking in Shaft								
3.	Development in Rock	18175.98	.062	2672.76	.011	15503.22	.051		
4.	Development in Ore	1908.01	.007	1081.16	.004	826.85	.003		
5.	Stoping	94257.72	.324	80610.68	.342	13647.04			.018
6.	Timbering	80840.21	.278	66957.87	.284	13882.34			.006
7.	Tramming	23912.04	.082	17173.00	.073	6739.04	.009		
8.	Ventilation	6658.17	.023	7696.65	.033			1038.48	.010
9.	Pumping	31250.00	.107	30056.10	.128	1193.90			.021
10.	Comp. & Air Pipes	19874.54	.068	19469.06	.083	405.48			.015
11.	Back Filling	345.15	.001			345.15	.001		
12.	Undg. Superintendence	9078.88	.031	8658.55	.037	420.33			.006
13.	Cave-in	6.00				6.00			
14.	Maint:Comp.& P.Drills	1680.89	.006	522.99	.002	1157.90	.004		
15.	Scraper Equipment	9437.36	.032	5602.01	.024	3835.35	.008		
16.	Elec.Tram Equip.	8816.80	.030	5559.60	.024	3257.20	.006		
17.	Pumping Machy.	2330.59	.008	2718.56	.011			387.97	.003
	Total U.G. Costs	308691.00	1.059	248804.12	1.056	59886.88	.003		
	Surface Costs:								
18.	Hoisting	17129.97	.059	15721.75	.067	1408.22			.008
19.	Stocking Ore	2854.70	.010	2377.01	.010	477.69			
20.	Screening-Crushing at Mine								
21.	Dry House	5454.47	.019	4321.16	.018	1133.31	.001		
22.	Gen.Surface Expense	4838.65	.017	4096.80	.017	741.85	.000		
23.	Maint: Hoisting Equipment	3994.96	.014	2575.53	.011	1419.43	.003		
24.	Shaft	2405.58	.008	4290.27	.018			1884.69	.010
25.	Top Tram Equip.	820.12	.003	1091.29	.005			271.17	.002
26.	Docks,Trestles,&Pkts	1114.16	.004	1860.60	.008			746.44	.004
27.	Mine Buildings	736.72	.003	1139.34	.005			402.62	.002
	Total Surface Costs	39349.33	.136	37473.75	.159	1875.58			.023
	General Mine Expenses:								
28.	Insurance	639.71	.002	299.80	.001	339.91	.001		
29.	Mining Engineering	1826.90	.006	1713.94	.007	112.96			.001
30.	Mech. & Elec. Engr.	1348.88	.005	1321.65	.006	27.23			.001
31.	Analysis & Grading	7541.91	.026	5329.68	.023	2212.23	.003		
32.	Personal Injury	17000.79	.059	11788.39	.050	5212.40	.009		
33.	Safety Department	625.97	.002	509.21	.002	116.76	.000		
34.	Tel.& Safety Devices	1945.00	.007	1486.56	.006	458.44	.001		
35.	Local & Gen. Welfare	3685.42	.012	3316.73	.014	368.69	.		.002
36.	Spec.Exp.,Pen. & Allow.	12254.50	.042	14199.11	.060			1944.61	.018
37.	Ishpeming Office	10438.22	.036	10663.96	.045			225.74	.009
38.	Saranac Investigation	1519.53	.005	3016.20	.013			1496.67	.008
39.	Mine Office	11448.55	.039	11242.64	.048	205.91			.009
	Total Gen.Mine Expense	70275.38	.241	64887.87	.275	5387.51			.034
	COST OF PRODUCTION	418315.71	1.436	351165.74	1.490	67149.97			.054
40.	Taxes	104158.77	.357	76085.80	.323	28072.97	.034		
	Depl'n & Depr'n	102632.84	.353	83102.77	.353	19530.07			
	Loading & Shipping	6636.75	.022	2352.65	.010	4284.10	.012		
	Adm. & Gen. Expense	8975.85	.031	9847.74	.042			871.89	.011
	Misc. Income	5059.47	.017	3660.72	.016	1398.75			.001
	Supply Inventory Adjust.	22.87		32.27				9.40	
	TOTAL COST	635683.32	2.182	518926.25	2.202	116757.07			.020

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

UNDERGROUND COSTS:

1. Exploring in Mine:
Increase is due to more Geological Department expense charged from Central Office.

3. Development in Rock:
Increase is due to opening of 13th level. This level was advanced a distance of 1,130 ft. in rock from the shaft. Air line respirators were installed to give the men pure air to breathe and also equipment for spraying the air and wetting down the broken rock to prevent dust. These items added to the cost per foot for rock drifting. Jack rods and bits were also introduced during the early part of the year for developing the 13th level. The initial cost of this equipment also added to the cost per foot.

4. Development in Ore:
This cost is very nearly equally divided between development work above the 12th level and drifting and raising in ore on the 13th level.

5. Stoping:
Increase in expense is practically accounted for by the 30 days more the mine worked this year. The cost per ton shows a decrease of .018 per ton. Tons per man for stoping increased from 21.60 tons per man in 1934 to 24.64 tons per man in 1935. Costs for 1931, 1932, 1933 and 1934 were benefited to a large extent by equipment and material on hand due to the large decrease in the working force in 1930. This surplus has practically all been used as noted by expending $400.00 for new auger steel, over $500.00 for repairs to drill machines over the expense in 1934, and several hundred dollars for tools and other material. Cost for powder averaged $ .25 per 100 lbs. above last years cost though the cost for all explosives decreased $ .0013 per ton.

6. Timbering:
Increase in expense for this account is due to 30 more working days though the cost per ton is $ .006 less. During the year the feet of timber per ton of ore decreased from .7002 to .654. The change in the plan of mining involving wider distribution of contracts caused fewer break downs necessitating repairs which has undoubtedly helped to raise the tons per man as well as reduce the cost for timber. The supply cost for timber only, decreased .0071 per ton while the average price per foot of timber increased .0006. Treated timber used on the 13th level added .0022 to the cost per ton for timber.

7. Tramming:
Increase in this account is due to additional men taken on to keep the tracks and levels clean. This in turn has decreased delays and maintenance of electric tram equipment.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

UNDERGROUND COSTS: (Cont'd)

8. Ventilation:
Decrease in this account is due to decrease in current required for operating ventilation fan at No. 2 shaft. Due to higher load factor cost of current was also lower in 1935. Less current used and lower cost per K.W. caused saving of approximately $1800.00 for the year. Expense for additional airways made the net decrease $1038.48 or .01 per ton for the year.

9. Pumping:
Increase is due to the mine making more water than in any year since 1929. The gallons increased 87 per minute as compared to 1934. Refer to paragraph "Pumping" in the annual report.

10. Compressors and Air Pipes:
Increase in total expense is due to 30 more working days. Developing of the 13th level has also added to the cost of this account.

Cu. Ft. of Air - 1935	501,336,761
Cu. Ft. of Air - 1934	437,985,000
Increase	63,351,761

11. Back Filling:
Increase in this account is due to breaking down filling to provide a mat in new territory under the hanging.

12. Underground Superintendence:
Increase in this account is due to 30 more working days.

14. Maintenance - Compressors and Power Drills:
Increase is due to purchase of three (3) RB-12 auger drill machines and two (2) N-72 drifting machines.

15. Scrapers and Mechanical Loaders:
Increase in this account is due to purchase of one (1) second-hand Ingersoll-Rand 15 H.P. scraper hoist, one (1) new 15 H.P. Sullivan scraper hoist and one (1) 25 H.P. scraper slide built at the General Shops. Considerable equipment such as electric switches, cables, etc., had to be replaced in 1935.

16. Electric Tram Equipment:
Increase is due to equipping the 13th level with electric haulage. Costs of new 40-lb. rail, ties, frogs, trolley wire, etc. amounted to approximately $2000.00. Balance of increase is for labor installing this material. There were no burn-outs of locomotive armatures in 1935.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

UNDERGROUND COSTS: (Cont'd)

17. Pumping Machinery:
This account shows a considerable decrease this year. In 1934 one of the 11th level pumps was moved and installed on the 12th level and also one new gear and pinion was purchased. A 100 gal. pump was installed in 1935, in the skip pit below the 13th level. There was also a charge in 1935 for excavating new pump house on the 13th level and sinking to sump level preliminary to excavating the sump.

SURFACE COSTS:

18. Hoisting:
Increase in expense is due to 30 more working days and hoisting from the 13th level (110 ft. deeper).

19. Stocking Ore:
Increase is due to 30 more working days.

21. Dry House:
Increase in cost is due to operating 30 more working days, also to putting up new stack for heating plant. 40 tons more coal used in heating plant in 1935 than in 1934. A proportion of the engineers wages was also charged in 1935 account of them looking after heating plant when the mine is idle (nights, Sundays and holidays).

22. General Surface Expense:
Increase is due to giving more attention to grounds and shrubbery around the mine buildings. The grounds were kept in better condition this year than in the three previous years.

23. Maintenance - Hoisting Equipment:
Increase in this account is due to one new cage rope and one new skip rope costing $1232.54 for both ropes. New steel linings costing $70.04 were installed on the head sheave.

24. Maintenance - Shaft:
Large decrease due to no expense in 1935 for repair of No. 2 shaft. Charges this year represent normal expense for maintenance of No. 3 shaft and the underground pockets. Charges in 1934 were much above normal due to unusual repairs to No. 2 shaft.

25. Maintenance - Top Tram Equipment:
This account shows considerable decrease over last year. A fire in the control house on the landing last year accounts for the higher cost in 1934. A new top tram car was built this year in the mine shops.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

SURFACE COSTS: (Cont'd)

26. Maintenance - Docks, Trestles and Pockets:
This account shows a decrease due to less cost for building new rock trestle this year. A new rock trestle was erected in 1934. Sixteen additional bents were erected in 1935.

27. Mine Buildings:
This account shows a decrease over the preceding year. This year the roofs of the shop and office buildings were given a coat of primer and sealcote. The enclosure at the collar of the shaft house was extended three feet to the south and three feet to the north to make more room for examination and repair of cage and skip, etc.

GENERAL MINE EXPENSES:

28. Insurance:
Central Office charge.

29. Mining Engineering:
This account shows a small increase due to more engineering work on account of developing the 13th level.

30. Mechanical and Electrical Engineering:
There is very little change in this account this year.

31. Analysis and Grading:
Increase in this account is due to increased production and shipments.

32. Personal Injury:
Central Office charge.

33. Safety Department:
Increase is due to remodeling of sample crusher house into a first aid room for storing of Negaunee District mine rescue equipment. This building will also be used for first aid and helmet practice for the three mines in this district. Expense for remodeling was distributed to the three mines in Negaunee.

34. Telephones and Safety Devices:
Increase in this account is due to repairing of lights, safety doors, etc., on the main levels, also equipping the 13th level with telephones and lights. 231 employees were given pocket knives for a six months safety record. The knives cost $150.00 and were charged to this account.

35. Local and General Welfare:
Central Office charge for local Company nurse and other welfare expense.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING: (Cont'd)

b. Detailed Cost Comparison: (Cont'd)
(7) Detail of Accounts:

GENERAL MINE EXPENSES: (Cont'd)

36. Special Expense, Pensions and Allowances:
Pensions amounted to $4781.37 this year as compared with $5721.97 in 1934. Other items charged from the Central Office accounts for the balance.

37. Ishpeming Office:
This account shows a small decrease in 1935.

38. Saranac Investigation:
Central Office charge. Lower account of less x-ray photographs taken in 1935.

39. Mine Office:
Increase in this account is for central warehouse overhead expense, account of purchase of more supplies by Negaunee Mine.

40. Taxes:

Detail of charges in 1935 and 1934 follows:

	1935	1934	Increase
City Tax	$ 95,226.14	75,461.45	
1934 tax charged in 1935	8,113.73		
Franchise tax	538.70	624.35	
Capital Stock tax	280.00		
Total	104,158.77	76,085.80	28,072.97

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

9. EXPLORATIONS AND FUTURE EXPLORATIONS:

There was no diamond drilling on Negaunee Mine property in 1935. There are no future explorations contemplated at this time.

Inspections of the drill hole (drilled in 1934) on Maas property near the Negaunee boundary during 1935 showed no loss of water in the hole which proved that the cave had not extended above the concrete seal near the bottom of the hole. There is therefore no immediate danger of a cave coming through to surface in this area. During the summer however, there were heavy breaks and falls in the formation, either on Negaunee or Maas Mine property - it was impossible to tell which. These falls often caused the houses nearby, on Park, Case and Main streets, to shake and vibrate in a very noticeable manner. The increase in mine water at the Negaunee Mine in the deepest area being mined indicates an extension of the cave and cracks in the overlying formation further to the west. No new caves appeared on surface during the year but they are likely to occur at any time.

10. TAXES:

The Negaunee City tax rate increased in 1935 for the first time in several years. The city tax was $27,166.59 higher than in 1934 and the tax rate $4.02 higher per $1000.00 valuation. The board of review made a blanket reduction of 10% in the assessed valuation of all real and personal property. This reduction did not apply to the mines but was applied to the rented buildings owned by the mining company.

The assessed valuation of the Negaunee Mine as set by the State Tax Commission was decreased $160,000 in 1935 but owing to the increase in the tax rate the actual taxes paid increased $8,698.61.

A comparison of taxes paid by the Negaunee Mine Company in 1935 and 1934 follows:

	1935		1934	
	Valuation	Taxes	Valuation	Taxes
Realty - 213.19 Acres	2,415,000	74,464.12	2,730,000	73,170.28
Personal-Stockpile,Equip. & Supp.	620,000	19,117.08	435,000	11,659.00
Total by Tax Commission	3,035,000	93,581.20	3,165,000	84,829.28
Collection Fees		935.81		848.29
Total Optg. Negaunee Mine	3,035,000	94,517.01	3,165,000	85,677.57
Rented Buildings	22,770	702.11	31,400	841.54
Collection Fees		7.02		8.42
Total Negaunee Mine Co.	3,057,770	95,226.14	3,196,400	86,527.53
Tax Rate		3.082		2.6802
Total Tax City of Negaunee (Includes collection fee)		366,574.10		339,407.51
Negaunee Mine Co. % of City Tax		25.98%		25.49%

MEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

11. ACCIDENTS AND PERSONAL INJURY:

The following table gives the number and classification of accidents causing personal injury during the past five years:

	1935	1934	1933	1932	1931
Fatal	0	1	0	0	0
Time Lost - Over four months	1	1	0	1	1
" " - One to four months	0	1	2	1	4
" " - Less than one month	0	1	0	1	0
Total Compensable Accidents	1	4	2	3	5
Number of cases paid compensation for accidents prior to Jan. 1st, 1935	8	10	14	14	12
Number of cases being paid difference in wages (Included in above total)	4	4	4	4	5

The nature of injury causing the lost time accident in 1935 was fracture of both legs just above the knees. The accident was classified by the Central Safety Committee as preventable and due to the carelessness of the injured man.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION:

No new E. & A.s were authorized and no old ones were active in 1935. Improvement to the dry building involving ceiling the rooms and installation of unit heaters is contemplated when conditions warrant the expenditure.

13. EQUIPMENT AND PROPOSED EQUIPMENT:

a. Steam Shovels:

There was 219,673 tons of ore loaded from stockpile by No. 7 shovel in 1935. Only minor repairs were made to the shovel in the winter of 1934-35. Extensive repairs have been started since the shovel was laid up in November and during the winter it will be given a thorough overhauling.

b. Stockpile Trestles:
(2) Wooden Trestles:

A total of 16 stocking bents were erected on the rock trestle in 1935. Most of the material used was salvaged from old ore and rock trestles, the main expense was for labor.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

13. EQUIPMENT AND PROPOSED EQUIPMENT:

c. Scraper Hoists:

Following is a list of scraper hoists at the mine:

Company	On Hand 1-1-1935	Purchased 1935	Total	Cost for Repairs Per Machine - Parts Only 1935	1934
Ing-Rand 15 H.P. Elec.	7		7	23.85	11.00
" 10 H.P. "	6		6	37.85	1.66
Sullivan 25 H.P. "	2		2	-	-
" 20 H.P. "	1		1	42.78	.56½
" 15 H.P. "	10	1	11	20.98	-
Gard-Den 15 H.P. "	2		2)	5.75	52.40
" 10 H.P. "	3		3)		
Total	31	1	32		
Lake Shore Engine Works 25 H.P. Electric Scraper Slide	1	1	2		

The two Gardner-Denver 15 H.P. hoists are kept in reserve to replace other hoists undergoing repairs. The three 10 H.P. units are practically worn out and will be scrapped in 1936.

The mine has 20 - 15 H.P. hoists and one ordered for delivery early in 1936 (E. & A. No. 684). There are also 6 - 10 H.P. hoists in use making a total of 26 now available for mining ore. A number of the hoists have been in service for several years and during the past year more of them had to be repaired. There are usually from one to three hoists out of commission for repairs so several spare machines must be kept on hand.

In order to speed up the development of the 13th level it was decided to drive two drifts which made it necessary to have another loader. A new 25 H.P. steel scraper slide loader was built in the general shops and delivered to the mine in December. It has a number of improvements not found on the old steel slide which was built several years ago by the Lake Shore Engine Works. It is estimated that the cost of the new loader will be saved within one year as compared with the expense of building a wooden slide which has to be torn down and rebuilt every time the drift advances 100 ft. to 125 ft.

Purchases in 1935 were as follows:

1 - 2nd hand Ingersoll-Rand 15 H.P. hoist delivered in 1934	$ 500.00
1 - New Sullivan 15 H.P. hoist	1125.00
1 - New 25 H.P. steel scraper slide	1230.00
Total expenditures for additional scraper hoists & equipment	$ 2405.00

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

13. EQUIPMENT AND PROPOSED EQUIPMENT:

d. Drill Equipment:

During the year the following drill machines were purchased:

2 -	Ingersoll-Rand N-72 - for rock drifting	$ 758.00
1 -	Ingersoll-Rand RB-12 (Second hand) for mining ore	87.50
1 -	Ingersoll-Rand RB-12 (New) for mining ore	190.00
	Total expenditures for new drill equipment	$ 1035.50

Under this heading brief comment will be made concerning the jack rods and jack bits used in rock work on the 13th level which replaced the old drill steel. In the hard ground encountered for several hundred feet in the main drift on the 13th as many as 65 jack bits were used on one 8-hour shift. Two or three sets of jack rods or approximately 18 pieces of steel were required by the two drill machines. With the drills formerly used at least 100 drills would be required with an equal number in the shop for sharpening. The use of jack bits therefore reduced the amount of drill steel from 200 to 300 drills down to less than 25. The detachable bits (jack bits) are made from high quality steel, correctly sharpened and tempered and can be sharpened three or four times before they are worn out. They reduce labor expense, investment in drill steel and permit of more rapid drilling and hence reduce the cost of drifting.

e. Haulage Tracks - 13th Level:

The main haulage tracks on the 13th level were laid with new 40-lb. rail and tie plates. Two Bethlehem Steel Company steel ties were used on each 30 feet of track to prevent the rails from spreading. The track has been rock ballasted and all ties tamped. The expenditure for new track equipment in 1935 was as follows:

40-Lb. Rail	$ 1013.46
Steel Ties & Tie Plates	285.93
Manganese Frogs	280.00
Total	$ 1579.39

This expense was charged to electric tram equipment.

14. MAINTENANCE AND REPAIRS:

Repairs to shafts and loading pockets were normal in 1935. Both No. 2 and No. 3 shafts were thoroughly overhauled and general repairs made in 1933 and 1934. Cost of repairs in 1935 were $2405.58 as compared to $4290.27 in 1934.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

14. MAINTENANCE AND REPAIRS: (Cont'd)

During 1935 one new cage and one new skip rope was installed replacing ropes that had worn. The old cage rope was put on the skip where it will be worn to the safety limit, the new skip rope replaced a worn out rope. New ropes are installed on the cage so as to always have the newest rope handling men and the partly worn cage rope is then put on the skip. Both skip ropes had to be replaced in 1935 and as stated above one was replaced by the partly worn cage rope and one with a new rope. The cost of the two new ropes was $1232.54.

Maintenance accounts under "Underground Costs" as per the cost sheet show expenditures of $22,265.64 in 1935 compared to $14,403.15 in 1934. The increase of approximately $8000.00 is accounted for by purchase of new drill machines, scraper hoists, scraper slide loader, material and labor installing track on the 13th level, also new trolley wire and permanent air lines on the 13th level. These new purchases are reported under the heading "13. EQUIPMENT AND PROPOSED EQUIPMENT" in this report. The balance of maintenance expense represents normal replacements and repairs. A considerable item in this expense is the cost of ropes used in scraper haulage. The service on these ropes is severe due to pulling around curves and over uneven surfaces. The kind of rope used is now standardized. It is a plow steel, 6 x 19 rope with independent wire rope center. Tests have shown that this rope gives the best sefvice.

The maintenance accounts under "Surface Costs" on the cost sheet show expenditures of $9071.54 in 1935 as compared to $12,957.03 in 1934. All the accounts with the exception of Hoisting Equipment show sizeable decreases, the largest being in the account "Shaft". Maintenance of "Hoisting Equipment" increased in 1935 due to charging out two new hoisting ropes while only one second-hand rope was charged in 1934, to charging one set stator coils in 1935 and one set steel reliners for head sheave at shaft, the balance represents normal repairs and replacements.

There is one condition at the mine that is deserving of comment in connection with repairs. When two crews of men starting working several years ago only one-half as much equipment was required as formerly when one crew of men worked. Repairs were held to a minimum due to the excess equipment on hand. However, after several years repairs become imperative asl also replacements of worn out equipment. Replacements started in 1935 and will continue in subsequent years.

MEGAUNSE MINE
ANNUAL REPORT
YEAR 1935

15. POWER:

The following is a detail of electric current purchased, charged as follows - also other data:

	1935 - 12 Months Optg.		1934 - 12 Months Optg.	
	Cost	Cost per Ton	Cost	Cost per Ton
Stoping	440.98	.0015	348.82	.0015
Timbering	58.51	.0002	79.89	.0003
Ventilation	5156.98	.0177	7035.82	.0299
Pumping	24277.98	.0832	24415.17	.1036
Hoisting	11973.45	.0411	11182.87	.0475
Stocking Ore	285.54	.0010	240.68	.0010
Dry House	162.64	.0006	176.86	.0007
Telephone & Safety Devices	527.80	.0018	504.18	.0021
Mine Office	27.33	.0001	22.10	.0001
Electric Haulage	3135.80	.0108	2779.39	.0118
Shops	72.29	.0003	138.15	.0006
Optg. Compressors	15541.98	.0533	15645.01	.0665
Total	61661.28	.2117	62568.94	.2656

Main Line Meter - K.W. (Less Maas charge)	4,419,313	4,080,021	
Separate Meter Reading - K.W.	4,316,543	3,971,304	
Line Loss - K.W.	102,770	108,717	(a)
Product - tons	291,318	235,664	
K.W. Per Ton (Inc. Line Loss)	15.17	17.32	
Cost Per K.W. (Avg. for Year)	.01435	.01535	
15 Min. Demand - K.W. (Avg. for Year)	1111	1255	
Load Factor - " " "	49.17%	42%	

A credit of $1958.08 for sales tax collected from May 1st, 1934 to May 31st, 1935 was taken up in December accounts.

It will be noted that the peak load for 15 minute demand was reduced 144 K.W. in 1935 and the load factor raised from 42% to 49%. This resulted in a lower charge per K.W. for current which on basis of K.W. used in 1935 effected a saving of $4419.31 in the cost for current. The pumping load now comes on the night shift when the mine is idle and reduces the 15 minute peak demand on the day shift.

(a) Line Loss May to December, inclusive.

17. CONDITION OF PREMISES:

a. Mine Grounds:

The grounds around the mine were given more attention in 1935. The shrubbery beds were pruned and cleaned also all the flower beds. The lawns were mown regularly and edges of walks and roads kept trimmed. An application of fertilizer is needed in the spring of 1936 as only very limited quantities have been applied in the past four years.

NEGAUNEE MINE
ANNUAL REPORT
YEAR 1935

17. CONDITION OF PREMISES: (Cont'd)

b. Negaunee Mine Company Houses:

The original number of houses moved from the Negaunee Mine Company property to the Cleveland-Cliffs Iron Company's first addition to the City of Negaunee was 20 which, since 1932, have been reduced by sales to 15 houses. One house was sold in December 1935. Of the 15 houses now owned, four are single, ten two-apartment and one three-apartment. A total of 27 families live in the 15 houses. Very few repairs were made in the period of 1932 to 1934 except to roofs, doors and windows but in 1935 two of the houses required extensive repairs. In one house new siding, window frames and new sash were necessary, while the other had to have a new roof and a number of new window frames. The houses are now in good condition except as regards exterior painting and several houses should be painted in 1936.

18. NATIONALITY OF EMPLOYEES:

The nationality record of employees is submitted in two forms, one as to parentage and the other as to country of birth. All new employees in 1935 were American born.

As to Parentage	1935	%	1934	%
English	43	18	42	18
Finnish	101	42	93	41
Italian	36	15	34	15
Swedish	27	11	29	12
French (Canadian)	22	9	18	8
German	2	1	3	1
Austrian	5	2	5	2
Irish	2	1	1	.5
Norwegian	1	.5	1	.5
Danish	4	1.5	3	2
Total	243	100	229	100

	American Born		Foreign Born	
As to Birth	1935	1934	1935	1934
English	23	22	20	20
Finnish	41	33	60	60
Italian	14	9	22	25
Swedish	13	14	14	15
French (Canadian)	21	17	1	1
German	1	2	1	1
Austrian	3	3	2	2
Irish	2	1	0	0
Norwegian	0	0	1	1
Danish	3	2	1	1
Total	121	103	122	126

MAAS MINE
ANNUAL REPORT
YEAR 1935

1. GENERAL

The Maas Mine operated continuously through the year 1935 on a curtailed basis. From January 1st to February 11th, the working schedule was four day shifts and four night shifts in the Bessemer area with two crews each working four days every other week. On February 11th, the working time was increased to three days per week and continued on this basis for the balance of the year. Further, in order to realize our Bessemer production, it was necessary to work some of the contracts five night shifts and also rush the raising program from the Fifth Level in order to develop more working places. By the first of May we were able to transfer all contracts to day shift, however, it has been necessary to tram on the Fifth Level and hoist one-half shift to get out the production and keep the raises empty to avoid hanging up.

We secured our estimated product without any trouble including several special grades for Charcoal and Puddle furnaces. This special ore had to be crushed. The ore for the Charcoal Furnaces was a low phosphorous non-bessemer grade averaging .065 phosphorous. The Puddle Ore had to be a soft plastic ore free from lumps of hard blue ore and close to a bessemer grade. There are only a few places in the mine where ore of this physical character are found and it took over a month to produce about 2,000 tons. The first report was that it was very satisfactory as to physical character and analysis, but when used in the furnace, it was found that a certain action took place that caused it to explode and peel off the sides of the furnace. We have no definite information what caused this action and if our ore can be used.

We continued to mine in the wet area above the Third Level and had two gangs driving drifts along the footwall in advance of mining operation so as to cut off as much water as possible from the other places. Progress in these drifts is slow and costly but must be pushed ahead in order to drain the orebody between the foot and hanging walls.

The stope on the West foot wall was exhaused during the latter part of October and the two contracts employed here are now slicing the ore under the hanging to the South. The exhausting of the ore in this stope has reduced our production materially as no timber was required in the stoping operation and a large tonnage was broken for the holes drilled, further, these gangs are mining under new hanging and it is necessary to break filling which slows up production.

It will be noted that 74% of the production was secured from the

MAAS MINE
ANNUAL REPORT
YEAR 1935

Race Course and Area 2, South of the Race Course, above the Fourth Level. On account of the closeness of mining operations to the main level in these areas, the main drifts are continually crushing and the repair cost has been very high. We are rapidly reducing this expense by abandoning certain portions of the Fourth Level drifts and hoisting timber and supplies from the Fifth Level and rearranging the course of the ventilating currents.

Development work during the year has been confined to raises from the Fifth through to the Fourth Level. At the beginning of the year three contracts were employed on raise work, but in May after all mining gangs were provided places to eliminate night shift, they were further reduced until during the latter part of the year only one gang was on this work. In January we will start driving the No. 7 Crosscut on the Fifth Level which will follow the West boundary of the Race Course. By driving this drift and putting up raises, we will develop another area under the hanging that can be mined at a lower elevation and permit spreading the contracts which are now working very close together. We hope by this means to improve conditions and reduce our timber repair cost.

Shipments from the Maas were 2,585 tons in excess of 1934 and 29,482 tons less than the year's production.

2. PRODUCTION
SHIPMENTS &
INVENTORIES

a. Production by Grades

	1935	1934	Increase	Decrease
Maas Bessemer	81,155	98,920		17,765
Race Course Bessemer	49,286	28,645	20,641	
Maas	172,723	130,752	41,971	
Race Course	60,316	20,768	39,548	
Total	363,480	279,085	84,395	
Rock	9,929	16,153		6,224
Total Hoist	373,409	295,238	78,171	

130,441 tons or 36% of the production was Bessemer grade.

MAAS MINE
ANNUAL REPORT
YEAR 1935

b. Shipments

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Maas Bessemer	18,318	60,269	78,587	100,232
Race Course Bessemer	29,261	20,343	49,604	20,415
Maas	86,276	69,469	155,745	190,482
Race Course	12,990	37,072	50,062	20,284
Total	146,845	187,153	333,998	331,413
Total Last Year	115,706	215,707	331,413	
Increase	31,139		2,585	
Decrease		28,554		

Included in the above is 28,134 tons shipped all rail to Charcoal furnaces.

c. Stockpile Inventories

Grade of Ore	12-31-35	12-31-34	Increase	Decrease
Maas Bessemer	21,774	19,206	2,568	
Race Course Bessemer	11,402	11,720		318
Maas	96,042	79,064	16,978	
Race Course	12,822	2,568	10,254	
Total	142,040	112,558	29,482	

d. Division of Product by Levels

	1935	%	1934	%
Third Level	83,391	23.0	48,571	18.0
Fourth Level	268,880	74.0	219,272	78.0
Fifth Level	11,209	3.0	11,242	4.0
Total	363,480	100.0	279,085	100.0

e. Production by Months

Month	Maas Bess.	Maas	R. C. Bess.	Race Course	Total	Rock
January	6,727	11,694	3,860	2,128	24,409	868
February	7,680	11,047	3,189	2,041	23,957	1,008
March	8,230	13,637	4,090	3,806	29,763	1,287
April	6,093	16,933	4,438	3,749	31,213	440
May	9,147	14,404	5,762	4,569	33,882	635
June	8,702	13,586	4,454	4,457	31,199	608
July	7,791	15,053	4,230	6,132	33,206	1,762
August	7,568	16,085	3,363	8,031	35,047	626
September	5,331	12,973	4,849	6,472	29,625	697
October	6,800	13,584	5,103	7,245	32,732	773
November	8,037	10,378	5,152	6,862	30,429	507
December	6,324	9,730	4,264	7,700	28,018	718
Total	88,430	159,104	52,754	63,192	363,480	9,929

MAAS MINE
ANNUAL REPORT
YEAR 1935

The product was distributed as follows:

	1935	1934	Increase	Decrease
George Maas Lease	217,752	208,857	8,895	
Catholic Cemetery	19,186	13,936	5,250	
American Mining Co.	2,736	1,896	840	
C.C.I.Co.(Right of Way)	6,634	2,750	3,884	
Race Course	115,946	49,413	66,533	
City of Negaunee	1,226	2,233		1,007
	363,480	279,085	84,395	

f. Ore Statement

	Maas Bess.	Maas	R.C. Bess.	Race Course	Total	Total Last Year
On hand 1-1-35	19,206	79,064	11,720	2,568	112,558	164,886
Product for year	88,430	159,104	52,754	63,192	363,480	279,085
Transfer to & from	7,275	13,619	3,468	2,876		
Total	100,361	251,787	61,006	62,884	476,038	443,971
Shipments	78,587	155,745	49,604	50,062	333,998	331,413
Balance on hand	21,774	96,042	11,402	12,822	142,040	112,558
Increase in output					84,395	
Increase in ore on hand					29,482	

Estimated stockpile overrun end of 1935 season:

Maas Bessemer	10,000 tons
Maas	40,000 "
Race Course Bessemer	4,000 "
Race Course	2,000 "
Total Estimated Stockpile overrun	56,000 tons

1935 1-8 hr. shift, 4 days per week, 2 crews working alternate weeks, January 1st to February 11th. Six days per week, 2 crews working each 3 days from February 11th through balance of year.

1934 1-8 hr. shift, 6 days per week and 5 nights in six Bessemer places; 3 crews working 3 and 4 days per week January 1st to September 1st. 4 days per week and 4 nights in six Bessemer places; 3 crews working 2 or 3 days per week September 1st to December 31st, 1934.

1933 1-8 hr. shift, 4 days per week, 2 crews working alternate weeks. Jan. 1st to April 8th.
Mine idle from April 8th to July 1st.
6 days per week, 3 crews 2 days each, April 8th to July 1st. 5th Level development.
6 days per week 3 crews 2 days each, July 1st to August 1st, Bessemer production and 5th level development.
5 days per week, 2 crews working alternate weeks, August 1st to November 13th.

MAAS MINE
ANNUAL REPORT
YEAR 1935

6 days per week and 5 nights; 3 crews working three or four days per week, Nov. 13 to Dec. 31st.

1932 1-8 hr. shift, 2 days per week, Jan. 1st to May 31st.
Mine idle June 1st to October 31st.
2 days per week, Nov. 1st to Dec. 31st.

1931 1-8 hr. shift, 5 days per week, Jan. 1st to May 1st.
4 days per week, May 1st to June 8th.
3 days per week, June 8th to Nov. 16th.
2 days per week, Nov. 16th to Dec. 31st.

1930 1-8 hr. shift, 6 days per week, Jan. 1st to July 16th.
5 days per week, July 16th to Dec. 31st.

g. Delays

Date	Shift	Duration	Loss in Product	Cause
Jan.12th	Day	3½ days	None	(1) See below
Feb.18th	Day	9 hours	400 tons	Skip loaded before hoisting engineer had given stop signal and set brake, jerking other skip into dump with such force that skip was wedged in dump and steel of shaft house bent.
May 6th	Day	2½ hours	300 tons	Skip runners near dump loose and shafthouse braces bent.
June 4th	Night	1 hour	100 tons	Trouble on skip hoist switch board.
June 17th	Day	1 hour	100 tons	Trouble on skip hoist switch board.
Nov. 19th	Day	2¼ hours	240 tons	New skip put on and then found it did not hang plumb and had to adjust shims.

(1) An accident to our pumping equipment occurred on Saturday morning, January 12th, about 10 o'clock. On account of the time that the accident happened and our working schedule at the time of four days per week, we worked the mine the last four days of the week of January 14th instead of the first and showed no loss in production.
The main Y casting in the discharge line in the third level pumphouse to which all of the pumps are connected, developed a large crack about three feet long in one of the branches. This put all of our pumping equipment out of commission as the pumps located on the fifth level only relay the water to the third level sump. Messrs. McClure and Keast, together with our local mechanical force, started to make temporary repairs in order to get the Prescott and Aldrich plunger pumps in operation. These temporary connections were completed by Sunday morning at 6:30 and these two pumps started. As soon as we realized the length of time it would take to re-establish pumping operations, in order to prevent a complete

drown out, a crew of timbermen and miners were called out to throw up dams at various points along our main levels. We have concrete frames a short distance back from the shaft in the main drifts in which flash boards can be installed for holding the water for a short period. These were put in first and then timber and dirt dams constructed further inside at various points to hold back the water.

The mine was making about 1200 gallons of water perminute since striking #7 drill hole and the pumps were idle approximately 21 hours. The capacity of the two pumps that were put into operation is 1500 gallons per minute. In order to hurry the drainage of the water from the dams, on Monday we connected the water from #7 drill hole into our air line on the third level and diverted it to the Negaunee Mine, which reduced the inflow to the Maas pumps by 150 gallons per minute.

The new Y branch was ordered immediately from the Crane Company and was received early in February so that permanent repairs were completed by the 16th of the month.

The cost of this accident was $881.76, divided between, Labor $494.35 and Supplies of $387.41.

h. Delays from Lack of Current

Date	Shift	Duration	Loss in Product	Cause
March 14th	Day	1½ hours	200 tons	Underground haulage cable burnt out in timber tunnel delaying all scraping and tramming operations.
Oct. 22nd	Day	1½ hours	250 tons	A defective insulator on the C.P. & L.Co's. 33,000 volt line to Ishpeming caused one wire to burn off and fall across the City of Negaunee line near the Pumping Station, causing a bad short circuit and complete shut down.

3. ANALYSIS

a. Average Mine Analysis on Output

Grade	1935 Iron	1935 Phos.	1935 Sil.	1934 Iron	1934 Phos.	1934 Sil.
Maas Bessemer	63.02	.040	5.80	63.11	.039	5.70
Maas	61.23	.072	6.65	61.20	.077	6.99
Race Course Bessemer	63.06	.039	5.75	63.33	.038	5.88
Race Course	61.48	.068	6.55	62.24	.062	6.84
Maas Special	63.51	.082	3.65			
Race Course Special	62.86	.086	3.96			

MAAS MINE
ANNUAL REPORT
YEAR 1935

b. Average Mine Analysis on Ore Shipped

Grade	Tons	Iron	Phos.	Sil.	Alum.	Mang.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course Bess.	128,191	63.00	.040	5.85	2.25	.22	.44	.18	.012	1.00	11.00
Maas & Race Course Non-Bessemer	205,807	61.00	.075	7.03	2.38	.23	.84	.20	.013	1.76	11.25

c. Average Analysis on Straight Cargoes

Grade	Mine			Lake Erie		
	Iron	Phos.	Silica	Iron	Phos.	Moist.
Lake Bessemer (Maas & Race Course Bessemer)	63.15	.040	5.77	62.93	.040	10.70

e. Average Analysis of Ore in Stockpile

Average Natural Analysis

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist
Maas Bessemer	56.18	.037	5.18	.170	1.99	.270	.130	.011	1.03	10.86
Race C. Bessemer	56.28	.034	4.89	.170	2.08	.760	.220	.011	.89	11.04
Maas	54.16	.066	6.55	.200	2.23	.770	.290	.011	1.77	11.25
Race Course	54.39	.060	6.04	.190	2.33	.770	.240	.010	.77	11.30

4. ESTIMATE OF ORE RESERVES

a. Developed ore

Assumption: 12 cu. ft. equals one ton.
10% deduction for rock.
10% deduction for loss in mining.

Location	Maas Lease Tons	Race Course Tons	Total Tons
Above 3rd Level	1,016,213	97,131	1,113,344
Between 3rd & 4th Levels	2,934,332	233,101	3,167,433
Between 4th & 5th Levels	1,733,479	1,125,753	2,859,232
Total above 5th Level	5,684,024	1,455,985	7,140,009
D.S.S.&A. Strip (Adams)	411,391		411,391
Total Maas Group	6,095,415	1,455,985	7,551,400

10.4% of total tonnage of Maas and Race Course is estimated to be Bessemer grade, 744,000

MAAS MINE
ANNUAL REPORT

The last complete estimate was made in 1931 and up to this year the annual production deducted. A new estimate was made this year which shows 39,000 tons more than the reserve tonnage of December 31st, 1934 after mining 363,480 tons during 1935. This increase of approximately 400,000 tons is explained as follows:-

1. 100,000 tons additional ore has been developed above the Third Level in the West footwall area due to changes in limits of areas taken in the December 1931 estimate.
2. Tonnage deductions have been made for the years 1932, 1933 and 1934 on which has been figured a 10% loss for mining and 10% deduction for rock, accounting for 150,000 tons.
3. During these past 3 years certain areas have been mined out and new areas used in figuring tonnages between elevations accounting for the balance or 150,000 tons.

The increase in available Bessemer tonnage is explained by a study which we made last May of the Maas Mine maps, sections and analysis of the ore in the various drill holes. The Bessemer tonnage was increased approximately 200,000 tons based on percentage being secured in the areas mined on the Maas and Race Course Leases and that expected in the future.

c. Estimated Reserve Analysis

Natural Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.
Maas & Race Course Bessemer	53.50	.040	6.40	.195	2.00	.80	.225	.010	1.10	12.00
Maas & Race Course Non-Bessemer	52.45	.060	6.63	.208	2.20	1.10	.320	.010	1.80	12.50

d. Estimated Production

The following is the estimated tonnage by grades on both a 3 day and 4 day week operating basis and expected analysis of the 1936 production from the Maas Mine.

Grade	Estimated Production 3 Day per Week Basis	4 Day per Week Basis
Maas & Race Course Bessemer	130,000 tons	168,000 tons
Maas & Race Course Non-Bessemer	230,000 tons	300,000 tons
Total	360,000 tons	468,000 tons

Expected Analysis of Above Tonnages

Grade	Iron	Phos.	Sil.	Mang.	Alum.	Lime	Mag.	Sul.	Loss	Moist.	Iron Natl.
Maas & Race Course Bessemer	63.00	.041	5.75	.22	2.32	.51	.19	.012	1.18	11.00	56.00
Maas & Race Course Non-Bessemer	61.00	.076	7.56	.22	2.30	.85	.25	.015	1.67	11.50	54.00

MAAS MINE
ANNUAL REPORT
YEAR 1935

5. LABOR & WAGES

a. Comments

1. Labor

The change in working schedule from two days per week to three days per week was announced through the Employee's Representatives on February 7th to become effective Monday, February 11th. The working time on a 3-day week basis is to have one crew work Thursday, Friday and Saturday of one week and the first three days of the following week, the crews changing on Thursday of each week.

During the spring and early summer, there was considerable agitation on both the Mesaba and Gogebic Ranges to unionize the mines. There was also talk of Labor Leaders coming to the Marquette Range. In talking to small groups of men on trips through the mine, indicated the men were satisfied with conditions and their treatment on the part of the company. There was a decided sentiment against outsiders coming into the district and starting trouble. As far as we know there was no evidence of any agitation in the district.

Very few changes have been made in our force during the year. Four men were taken on in April to make repairs to the Crushing Plant and early in May a few additional men were hired to fill out a crew for operating the Crushing Plant and a pit crew for the shovels. These extra men were laid off the end of October after the close of shipping season.

As few repairs had been made to our location houses since 1929, we had to increase our regular crew of 4 men to 20 for repairs, interior decorating and outside painting. These extra men were all laid off again November 1st.

The men at the Maas Mine, some 275 of the 300 men employed, held a very successful stag picnic on Sunday, June 23rd., in the grove Northeast of the mine. Each man paid $.50 which was used for the purchase of beer and food. All arrangements were made by their own committees. The Company furnished the lumber and material for the stands and a few benches, the labor was performed by men off of shift. There were two baseball games between Surface and Underground men, one in the morning and one in the afternoon, also horse-shoe contests, races, etc. A dutch lunch was served at noon and during the afternoon. It produced a good spirit among the men and gave them something to talk about for several weeks afterwards. The Company furnished the cigars.

2. New Construction

There was no new construction undertaken during 1935.

MAAS MINE
ANNUAL REPORT
YEAR 1935

b. Comparative Statement of Wages & Product

	1935	1934	Increase	Decrease
Product	363,480	279,085	84,395	
Number of Shifts & Hours -8-	303	273	30	
AVERAGE NO. MEN WORKING				
Surface	52	52½		½
Underground	246	246½		½
Total	298	299		1
AVERAGE WAGES PER DAY				
Surface	4.21	4.12	.09	
Underground	5.08	4.78	.30	
Total	4.90	4.65	.25	
AVERAGE WAGES PER MONTH 3 Days per Week				
Surface	80.39	67.71	12.68	
Underground	78.88	66.77	12.11	
Total	79.14	66.94	12.20	
PRODUCT PER MAN PER DAY				
Surface	30.48	26.97	3.51	
Underground	7.93	6.75	1.18	
Total	6.29	5.40	.89	
LABOR COST PER TON				
Surface	.138	.153	[illegible]	.015
Underground	.641	.708	[illegible]	.067
Total	.779	.861	[illegible]	.082
AVERAGE PRODUCT MINING				
Stoping	19.58	17.10	2.48	
Ore Development	8.11	9.84		1.73
	18.74	15.72	3.02	
AVERAGE WAGES CONTRACT LABOR	5.745	5.255	.49	
TOTAL NUMBER OF DAYS				
Surface	11,923½	10,342¾	1,580¾	
Underground	45,821¼	41,275¼	4,546	
Total	57,744¾	51,618	6,126¾	
AMOUNT FOR LABOR				
Surface	50,163.13	42,659.53	7,503.60	
Underground	232,852.28	197,515.95	35,336.33	
Total	283,015.41	240,175.48	42,839.93	
AVERAGE WAGES PER MONTH BASED ON MEN CARRIED ON MINE PAYROLL				
Surface	77.86	64.63	13.23	
Underground	78.10	65.70	12.40	
Total	78.06	65.75	12.31	

MAAS MINE
ANNUAL REPORT
YEAR 1935

5. LABOR AND WAGES

b. Comparative Statement of Wages and Product (Cont.)

Proportion of Surface to Underground Men

1935 - 1 to 4.9 — 4 days per week, 2 crews working alternate weeks, January 1st to February 11th.
6 days per week, 2 crews working each 3 days, from February 11th through balance of year.

1934 - 1 to 4.7 — 1 8-hr. shift, 6 days and 5 nights per week, 3 crews working 3 and 4 days per week, Jan. 1st to August 31st.
1 8-hr. shift, 4 days per week, 3 crews working 2 and 3 days per week, September 1st to December 31st.

1933 - 1 to 4.85 — 1 8-hr. shift, 2 days per week, January 1st to April 8th.
Mine idle April 8th to July 1st.
1 8-hr. shift 2 days per week, April 8th to July 1st - 4th Level Development.
1 8-hr. shift 2 days per week, partial operation July 1st to August 1st.
1 8-hr. shift, 5 days per week, 2 crews working alternate weeks August 1st to November 13th.
1 8-hr. shift, 6 days and 5 nights per week, 3 crews working 3 and 4 days per week, November 13th to December 31st.

1932 - 1 to 4.88 — 1 8-hr. shift, 2 days per week, January 1st to May 31st.
Mine idle June 1st to October 31st.
1 8-hr. shift, 2 days per week, November 1st to December 31st.

1931 - 1 to 4.63 — 1 8-hr. shift, 5 days per week, Jan. 1st to May 1st.
1 8-hr. shift, 4 days per week, May 1st to June 8th.
1 8-hr. shift, 3 days per week, June 8th to Nov. 16th.
1 8-hr. shift, 2 days per week, Nov. 16th to Dec. 31st.

6. SURFACE

a. Buildings, Repairs

The roof of the Dry Building which started to leak badly during the summer was repaired by putting on new roofing sheets at the West end and then giving the entire roof a coating of primer and tar. Repairs were also made during the fall to the brick work under the East door of the Power House and Sub Station. Only minor repairs were made to other buildings during the year.

MAAS MINE
ANNUAL REPORT
YEAR 1935

6. SURFACE

b. Location Dwelling Repairs

The Maas Mine Dwellings were placed under my supervision in April 1935.

On December 31st, 1935, the Maas Mine owned 126 dwellings,

98	Single Dwellings, housing	98 families
4	Double Dwellings, housing	8 "
21	Single Dwellings, housing 2 families each,	42 "
2	Single Dwellings, housing 3 families each,	6 "
1	Single Dwelling, housing 4 families,	4 "
126	Dwellings, housing a total of	158 families

During the year three of the dwellings in the New Location were sold on time contracts. One dwelling, No. 109, previously sold, was returned to the Company on account of being unable to make regular payments. This dwelling was traded to Wm. Sundquist for his property on Lot 4, Block 33 of the Pioneer Iron Company's Plat to the City of Negaunee.

On December 15th, 1935, the Company purchased from The First National Bank of Negaunee, two houses located on Lot 2, Block 32, Pioneer Iron Company Plat.

Very little was spent on maintenance of our dwellings during the depression years, and in 1935 it was found necessary to spend a considerable amount due to the poor condition many of the houses were in. The principal repairs were new roofs on 16 houses, rebuilding porches, repairing siding and interior decorating. As for the interior decorating, we furnished kalsomine and paint, the tenant doing the labor. Where papering was done, the company either furnished the paper and tenant put it on or the labor and tenant purchased the paper. The exterior of 14 houses were painted during the summer. This work was done by hiring three experienced painters and giving each one two or three young men, sons of some of our old employees, with large families, as helpers.

As we are doing considerable mining on the Race Course Lease, we should begin to think about moving some of the houses in the area East of Mitchell Ave., in fact some adjacent to the West line of the Race Course property should be moved this summer.

b. Stockpiles

The stockpiles along the East steel trestle were almost entirely cleaned up leaving plenty of room for 1936 stocking. One complete cut and part of a second was taken on the South side of the Maas pile. During August it was realized that very little more Maas ore would be loaded from stockpile considering the production and tonnage of Race Course ore in stock that would have to be loaded out to make room for the coming year. The carpenters started framing timber and erected a 22 bent trestle extending Southwest from the end of

MAAS MINE
ANNUAL REPORT
YEAR 1935

6. SURFACE

b. Stockpiles (Cont.)

the West permanent trestle, in September and October.

In April and May the carpenters and surface crew framed and erected a new branch trestle of 10 bents for a rock dump. This trestle extends to the Northeast from the end of the North side of the steel trestle. A second branch of 10 bents was also constructed on the South side.

c. Tracks, Roads, etc.

A settlement occured under the main Railroad track North and East of the shafthouse near the timber tunnel. This area was filled many years ago and due to heavy rains settled. A flange on the pump discharge line broke. In order to take off any strain caused by passing locomotives, a concrete wall was built on each side of the pump discharge and air line and rails set in the top to carry the ties. These pipes now pass through an open culvert under the tracks.

d. Timber Yard

We continue to receive our mine timber throughout the year both by rail and truck. In this way we are able to eliminate the waste of having to cull due to rot when kept on hand a long time. Further, we are able to maintain a steady surface crew and can work in the unloading of a few cars a week along with our other work. We received 214 cars of stull timber, cribbing, poles, lagging and plank during the year.

7. UNDERGROUND

a. Shaft Sinking

There was no shaft sinking during 1935.

b. Development

Third Level
During December 1934 diamond drill hole No. 7 was encountered in a raise above the 401 feet sub level where the ore is being mined by the sub level stoping method. The hole was making 150 gallons of water per minute. An attempt was made to block the hole by forcing quick setting cement through a pipe up into the hole. When the valve on the pipe which had been driven up the hole was closed, it developed a pressure of 320 lbs. and the water began to spread over the back. This pressure represents a static head of 739 feet. The blocking of the hole was temporarily abandoned until we could raise up to solid ground a safe distance above the back of the stope. This hole had drifted some distance off the vertical from its location underground.

In February a raise was started from the West end of an old sub drift to the North of the stope. It was put up so as to be about 100 feet

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND

b. Development (Cont.)
Third Level (Cont.)

above the back of the stope. From the top of the raise it was necessary to drift about 40 feet Southwesterly through very hard jasper and cut out on the sides of the drift to locate the hole. It was found on April 24th. Due to the fact that the quantity of water draining from the hole had decreased since it was first encountered and the static head indicated it would rise to ledge if plugged, it was decided to drive a pipe into the hole and carry it to the Third Level, keeping it under control. The ledge contours show that if the hole were plugged and the water raised to ledge, it would drain into the cave.

One contract was employed from May until August putting up No. 18W Raise to the 401 foot elevation. It is located 45 feet West of No. 20W and will permit two contracts mining in the Race Course area. Ore was encountered 35 feet above the level.

The Second Level drift, connecting with the Negaunee Mine, carries a large quantity of water. A pillar of ore has been left on the Roman Catholic Cemetery Lease, East of the winze off No. 118 Raise, in hopes that this ditch could be maintained and the ore below mined dry. Due to mining below, there is a sliding on the foot and part of the water is seeping through. A gang started a raise in the foot wall North of No. 118 raise from the 401 feet sub level in December. The raise was put up to the East and cut out 90 feet above the sub or at the 490 foot elevation. A drift is being driven in rock paralelling the second level drift from which small raises will be put up to drain the water through this drift, and prevent it following the foot and making the ore in this area wet and expensive to mine and handle.

Fourth Level

The only development on the Fourth Level during the year was connecting up the 5600 series of raises from No. 5634 to 5622 and driving several timber and ventilation drifts.

Fifth Level

The development on this level was confined entirely to raising. No. 510 raise was put up from the South footwall drift to the 140 foot sub above the Fourth Level and seven raises, Nos. 5632 to 5620 inclusive, were put up to the Fourth Level, while No. 5618 has not been completed.

We plan to start No. 7 Crosscut the first of the year and put up raises in order to mine another block under the hanging and separate our contracts more to avoid the crushing condition which makes retimbering costs high.

MAAS MINE
ANNUAL REPORT
YEAR - 1935

7. UNDERGROUND (CONT.)

c. Stoping
General

There was an average of 30 contracts engaged in mining at the Maas Mine during the year. The general schedule of operation, was to work 6 days per week with 2 crews, one working Thursday to Wednesday of the following week, on alternate weeks, so that each man averaged 3 days per week. In addition to this, up to May 1st, several contracts worked 6 days and 5 night shifts in order to secure as much Bessemer ore as possible. The night shift was partly necessary to not having sufficient scraper hoist units to equip all gangs on a single shift. The 30 contracts were distributed as to steps in mining as follows: stoping in open stope 1½; slicing 20; drifting 7; cutting out from raises for new places 1; and blasting and filling under new hanging ½ contract.

There were also approximately 3 contracts employed continuously on development work, most putting up raises from the Fifth Level.

Mining was confined mainly to 3 areas: (1) the East Footwall Pillar above the Third Level on the 465' and 450' sub levels; (2) the West Footwall Area South of the dike above the Third Level on the 435', 425', 401' and 345' sub levels; (3) the area in the South part of the Race Course, and Southwest of the Maas to the Negaunee boundary, all lying West of the East boundary of the Race Course, on the 150', 140', 130' sub levels, Fourth Level and 100' sub level.

The first mentioned area is very wet and difficult to mine efficiently. It includes the Roman Catholic Cemetery Lease, C.C.I.Co. strip, Adams strip and Maas fee. The water not only causes trouble in the contract but all along the line until the ore is dumped on the stockpile. It causes a delay in tramming as scraping is only done when cars are spotted under the chute, each car has to be dumped directly into the skip, holding the train longer at the pocket; and then again there is often trouble on the top landing due to wet dirt. There is also considerable loss of ore into the ditches on the Third Level which entails continual cleaning during the week and a large crew on Sundays.

In the second area another system of mining was in progress up to October of this year. The ore on the footwall above the 401' sub level was mined by the open stope method as the foot is very flat and the distance between foot and hanging about 50 feet. There will never be any workings under this stope so that it was not necessary to establish a matt and this method of extraction without the use of timber was employed with very good results.

The third territory is very heavy due to being just above the Fourth Level, where the drifts have been repaired several times causing a loosening of the ground above the drifts and throwing weight on the sub level drifts. Up to the latter part of the year there were not

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

6. Stoping (Cont.)
General (Cont.)

sufficient raises to allow the contracts being separated and as a result, they have been working almost along side of each other on one elevation, which also increases the crushing condition. It is proposed to separate the gangs as much as possible and further, as mining reaches below the Fourth Level this condition will be greatly improved.

Subs Between 2nd & 3rd Levels

East Footwall Pillar

475' Sub Level

The only work on this elevation during 1935 was in the first 3 months, when one contract completed mining the remaining pillar off of No. 119 raise. This was in the Roman Catholic Cemetery Lease.

465' Sub Level

Mining on this sub level has been intermittent. It was opened up originally in 1916 when a small tonnage was mined under the hanging and several drifts driven in the footwall area. It was then found that there was ore above and mining was stop;ed. It was reopened in 1928 and used as a transfer sub. Later a new drift was driven in the footwall on the Third Level and new raises put up so the ore could be mined direct to the Third Level. In 1931, mining started again and was stopped in 1932 when the mine was closed. It then remained idle until March 1934 when mining was resumed and continued until September of this year, at which time all the ore, with the exception of a pillar on the footwall east of No. 118 raise, which has been left to hold back the water on the Second Level, had been removed. Six contracts were employed mining here mostly in the Roman Catholic Cemetery Lease.

450' Sub Level

This sub level like the one above was opened up in 1916 and nothing more done until this year when mining was started from both the West and East ends. Two contracts have been driving along the footwall, one from No. 111A raise and one from No. 118 raise, trying to cut off the water and improve mining conditions to the South. A connection has also been made along the hanging. In December 6 contracts were mining here. Ore has been mined from the Adams and C.C.I.Co. strips, Roman Catholic Cemetery and Maas Leases.

401' Sub Level

One contract was raising on the footwall in December to cut off the water on the Second Level which is now draining through the workings on account of the footwall being cracked due to mining below. No other work was done at this elevation in this area during the year, except

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

c. Stoping (Cont.)

401' Sub Level (Cont.)

general repairs to maintain the travelling road to the Negaunee Mine for ventilation.

West Footwall Pillar

425' Sub Level

This sub was opened up by one contract in 1934 and has been worked continuously throughout the year. Except for a small area in the City of Negaunee strip, the mining has been in Race Course territory. It has been mined from one raise, No. 20W. During the summer No. 18W was put up to the sub below from the Third Level and this area can now be mined by two gangs when the sub below is opened up.

401' Sub Level

The ore on the North or footwall has been mined by stoping up on the flat foot, somewhat on the sub level stoping system. A drift was driven from No. 1W Raise along the foot wall and then stopes developed at right angles to this drift. The ore from the stopes was scraped into the main drift, which was transferred to No. 1W Raise by a large 25 horsepower hoist. This was a 4 man contract with two or three men breaking ore and one or two scraping. The hanging in this territory is very hard and stands well, so all the ore could be mined without leaving pillars. The ore on the foot was exhausted in October, when slicing operations were started for mining the pillars on either side of the main drift off of No. 1W Raise. When slicing started, the crew was divided and two of the men transferred to No. 18W Raise in the Race Course, same elevation. This latter gang began mining to the West of their raise under the hanging. These two contracts were mining from Nos. 1W and 18W Raises in December.

345' Sub Level

The only work at this elevation in 1935 was in January when the small area East of the mining limit was completed. This territory has been abandoned until mining to the West reaches this elevation.

Sub Levels Above the Fourth Level

The ore mined in this area, Block #1 in the Race Course and South of the Race Course in Area #2 on the Maas, lying West of the East boundary of the Race Course, averages between 40% and 50% Bessemer grade. Practically all the ore mined in this territory in 1935 was mined and trammed from raises put up from the Fifth Level to the Fourth Level and subs above. There was an average of 22 contracts employed here during the year, about one-third being in the Race Course Lease.

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

c. Stoping (Cont.)

150' Sub Level

Mining was first started on this elevation in 1930 and has been continuous until August of this year when mining was completed in Block No. 1. Nearly all of the work this year was in the Maas Lease. A small tonnage was mined South of the dike from the C.C.I.Co. and Adams strips.

140' Sub Level

Except for the small area on the North footwall mined from No. 240 raise, Fourth Level, this entire sub level has been mined from the Fifth Level raises during 1934-1935. In December there was one contract in the Race Course off of No. 5510 transfer raise, mining the remaining ore under the hanging and 4 contracts in the Maas South of the Race Course. The gang South of the main dike will finish early in January and then cut out on the sub below. The other 3 gangs have several months work to exhaust the ore left in this mining block. The grade of ore from this sub level has been high in iron and about 50% Bessemer.

130' Sub Level

The only work on this elevation previous to this year was the connecting drift berween 4 raises in the 5500 series in the Race Course. During this year mining was completed from No. 5516 Raise to the South boundary of the Race Course and also under the hanging from No. 5626 Raise to 5642 Raise inclusive. The ore under the hanging is mostly non-bessemer. In December 2 contracts finished mining on this sub level.

The Western half of Block No. 1 on the Maas was almost completed in December, while the Eastern half was just being started South of the Race Course. There were six gangs mining in the area South of the Race Course in the Maas.

Fourth Level

Mining reached this elevation in February and has been almost entirely in Race Course territory, off the 5500 series of raises. This part of Block No. 1 has been completed from No. 5520 raise to the South boundary of the Race Course. The new raises put up from the Fifth Level off of No. 6 Crosscut have been connected as far North as No. 5622 and mining started on this elevation from several of them. In December there were 6 contracts in the Race Course Lease and 2 in the Maas.

Sub Levels Above the Fifth Level

100' Sub Level

In November one contract cut out from No. 5524 raise and drove a drift

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

c. Stoping (Cont.)

100' Sub Level (Cont.)

connecting Nos. 5526 and 5528 raises. They will drift as far as the South boundary of the Race Course before starting to mine. It is our intention to try to allocate two raises to a contract so as to allow the area mined to settle before mining up against it.

60' Sub Level

During August and September a drift was driven on this elevation off of No. 5428 raise 105' to the East and then a raise put up to the Fourth Level, holing near the entrance to the 400 drift, where the air comes down from the Negaunee Mine. This raise will serve for ventilation when mining below the Fourth Level and the Fourth Level drifts to the South have been closed due to crushing.

50' Sub Level

One contract started here in August off of No. 5522 Raise and drove a drift connecting the raise as far as No. 5526. This drift was driven as a timber and supply sub but was stopped until a later date.

Fifth Level

The only work done on this level during the year was raising and several cut outs made for storing timber. Ten raises were put up to the Fourth Level and above. These raises were No. 510 from the South footwall drift, No. 5520 from No. 5 Crosscut and Nos. 5620 to 5632 inclusive, from No. 6 Crosscut. No. 5618 was in progress during December.

Arrangements have been made to start No. 7 Crosscut soon after the first of the year in order to develop another mining block and have more available working places.

d. Timbering

74% of the total tonnage mined during 1935 was secured from the area above the Fourth Level. As mining operations approach closer to the main drifts, we experienced a very bad crushing condition which required an unusual amount of retimbering. In retimbering of the main drifts, it was always necessary to excavate a certain amount of ore from the back and sides of the drift in order to get in a full size set of timber. This in turn loosened the ground above and caused a general movement that made it necessary to make extraordinary repairs in the sub level areas. This condition will show a decided improvement during the coming year as a larger number of our mining operations will be conducted either on the Fourth Level elevation or below. Further, during the last few months of the year,

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

d. Timbering (Cont.)

we began to hoist more timber from the Fifth Level which permitted the abandoning of certain portion of the Fourth Level drift that previously we had been forced to keep open in order to get timber to the contracts.

A study of the Statement of Timber Used shows a marked decrease in the amount of cribbing for 1935 compared with 1934 and is explained by the fact that during 1935 ten new raises were put up from the Fifth Level compared with 24 in 1934. The feet of stull timber per ton of ore was slightly more in 1935 than the previous year and is due entirely to the large amount of repair work in the main Fourth Level drifts as explained above. The increase in feet of poles per ton of ore mined is due to extending mining operations under new hanging where we cover the bottoms of the drifts solid with poles compared with spacing them 6" or 8" apart where a good matt has been formed above.

While the price actually paid for timber in 1935 was slightly less than in 1934, the increased cost as shown on the statement is due to the fact that we used a quantity of treated timber for lining sets on the Fifth Level which brought up the average price per foot. The cost per ton for all timber is the lowest in many years and due to the fact that we are using more 9' timber and giving more batter to the legs of the drift sets.

Statement of Timber Used

Kind	Linnear Feet	Price	Amount 1935	Amount 1934
6" x 8" Cribbing Timber	90,831	.0343	3,115.59	6,363.44
8" x 10" Stull "	79,086	.0537	4,249.63	2,406.73
10" x 12" " "	87,207	.0777	6,778.97	5,297.46
12" x 14" " "	22,011	.1037	2,281.71	2,743.24
12" x 14" Treated "	3,180	.2138	680.00	
Total Timber - 1935	282,315	.0606	17,105.90	
Total " - 1934	330,020	.0509		16,810.87
7' Lagging	1,159,770	.727	8,427.68	6,661.73
9½' Poles	694,225	1.038	7,212.53	5,800.81
Total - 1935	1,853,995		15,640.21	
Total - 1934	1,471,153			12,462.54
Wire Fencing - Sq. Ft.	38,500	.0062	239.58	161.95
Grand Total - 1935			32,985.69	
Grand Total - 1934				29,435.36

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

d. Timbering (Cont.)

	Amount 1935	Amount 1934
Product, Tons	363,480	278,985
Feet of Cribbing & Stull Timber per ton of Ore	.777	1.183
Feet of Stull Timber per ton of Ore	.527	.500
Feet of Lagging per ton of Ore	3.1907	3.5196
Feet of Poles per ton of Ore	1.9099	1.7536
Feet of Wire Fencing per ton of Ore	.0106	.0234
Feet of Lagging per Foot of Timber	4.1081	2.9753
Feet of Poles per Foot of Timber	2.4590	1.4824
Cost per Ton for Timber	.0471	.0602
Cost per Ton for Lagging	.0232	.0239
Cost per Ton for Wire Fencing	.0006	.0006
Cost per Ton for Poles	.0198	.0208
Cost per Ton for All Timber	.0907	.1055
Equivalent of Stull Timber to Board Measure	528,914	587,534
Feet of Board Measure per Ton of Ore	1.455	2.106

Total Cost for Timber, Lagging, Poles, Etc. and Cost per ton

Year	Amount	Cost per ton
1935	32,985.69	.0907
1934	29,435.36	.1055
1933	23,285.71	.1769
1932	10,857.50	.1199
1931	32,879.88	.1076

e. Drifting and Raising

The following is a comparison of the drifting and raising in the years 1935 and 1934:

	Drifting		Raising	
Year	Ore	Rock	Ore	Rock
1935	449	231	1,314	145
1934	1,296	541	2,889	721
Decrease	847	310	1,575	576

There was a decided decrease in the amount of development drifting and raising during the past year. There was no main development drifting except the driving of drifts to connect raises put up from the Fifth Level at the Fourth Level elevation. The large decrease in both ore and rock raising is explained by 11 raises being put up during 1935, 10 of which were from the Fifth Level, compared with 26 in 1934, 24 of which were from the Fifth Level.

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

e. Drifting and Raising (Cont.)

During the coming year No. 7 Crosscut will be driven along the West line of the Race Course property and raises put up to develop another mining block so that our contracts can be spread over a greater area than is now possible.

f. Explosives, Drilling and Blasting

The cost per for all explosives shows a decrease over 1934 being $.0580 compared with $.0614, although the price paid for powder in 1935 shows an increase. This decrease in cost is due to using less powder per ton of ore mined, which is due in part to our mining a substantial tonnage from the stope above the Third Level, where a large tonnage was broken for the number of holes and powder used.

Due to the decrease in rock development, the explosives used for this work shows a corresponding decrease.

Stoping and Ore Development

Kind		Quantity Pounds	Average Price	Amount 1935	Amount 1934
1¼" 40% Amonia Gel.Pwd.					204.75
1¼" 50% " " "		145,325	.1171	17,012.16	13,533.09
1¼" 60% " " "					22.05
Total Powder 1935		145,325	.1171	17,012.16	
Total Powder 1934		121,875	.1129		13,759.89
Fuse	ft.	488,275	.568 C.Ft.	2,773.08	2,280.76
#6 Blasting Caps	No.	79,930	1.124 C	898.10	729.66
Electric " "	Ea.	1,400	.1054	147.60	80.26
Powder Bags	Ea.	58	2.245	130.22	106.65
Tamping Bags	M	8,000	2.34	18.70	17.25
Fuse Lighters	M	11,500	6.75	77.62	64.13
Fuse Seal	Can	12	.60	7.20	12.00
Blasting Machines	Ea.				70.00
Connecting Wire	Lb.	4	.40	1.60	
Total Fuse,Caps, etc.				4,054.12	3,360.71
Total All Explosives				21,066.28	17,120.60
Product, Tons				363,480	278,985
Pounds of Powder per ton of Ore				.3998	.4368
Cost per ton for Powder				.0468	.0493
Cost per ton for Fuse, Caps, etc.				.0112	.0120
Cost per ton for all Explosives				.0580	.0614

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

f. Explosives, Drilling and Blasting (Cont.)

Rock Development & Filling

Kind	Quantity Pounds	Average Price	Amount 1935	Amount 1934
1¼" 50% Amonia Gel. Pwd.	2,425	.1171	284.94	814.44
1¼" 60% " " "				229.08
Total Powder 1935	2,425	.1171	284.94	
Total Powder 1934	9,075	.1150		1,043.52
Fuse Ft.	9,005	.614 C'	55.28	195.00
#6 Blasting Caps No.	1,455	1.0816 C	15.73	60.06
Total Fuse, Caps, Etc.			71.01	255.06
Total All Explosives			355.95	1,298.58
Total Explosives used at Mine			21,422.23	18,419.18
Average price per pound for powder			.117	.113

Statement showing cost per ton for Explosives, exclusive of rock development, for the period 1931 to 1935:

Year	Cost per Ton	Production
1935	.0580	363,480
1934	.0614	278,985
1933	.0634	131,574
1932	.0593	90,531
1931	.0629	305,604

h. Mining and Loading

All of the ore mined has been handled with scrapers. At the beginning of the year there were three places where the ore had to be transferred. In one of these places a transfer was eliminated by putting up No. 20W raise on the Third Level to the elevation of the 425' sub level. The second transferring was stopped in October when the ore in the stoping area above the Third Level was exhausted. The only transfer now in operation is at the North end of the Race Course area above the Fourth Level. Up until May, it was necessary to work some of the places in the Bessemer area above the Fourth Level double shift due to the fact that we did not have sufficient scraper equipment. Two new Sullivan 15 horsepower scraper hoists were purchased in March and two more in August. The hoists used in connection with the stoping operation and transfer, were the large 20 and 25 H.P. type. When mining is started on the sub below and we begin to have a crushing condition, these hoists cannot be used on account of their size. Two new hoists are now on order for delivery February 1st, to replace these large hoists that are now being used by two contracts on the top sub level in this area.

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

h. Mining and Loading (Cont.)

We are still using two 6½ H.P. machines but they should be replaced as soon as possible as they are not as efficient as the larger type hoist.

As mining below the Second Level is now below the 465' elevation, where timber was handled through a winze, most of the timber must now be hoisted from the Third Level. As explained above in this report, the timber serving the contracts in the Fourth Level territory is being gradually handled through the raises from the Fifth Level. During the year we have had nine of our old double drum air hoists changed over to single drum machines for hoisting timber.

i. Ventilation

The middle of October 1934, we sent two of our raising crews to the Negaunee Mine to put up new raises and enlarge others so as to increase the airways and amount of air reaching the Maas Mine. They stripped a raise between the Ninth and Six and One-Half Levels, a distance of 115' from a 4' by 4' open raise to an 8' by 8' without timber. They then moved to the Tenth Level and put up a rock raise to the Ninth, a vertical distance of 100', incline distance 140' and another raise of the same size, 8' by 8', from the Eleventh to the Tenth Level. This work was completed by the end of April. The work directly effecting the Maas Mine has all been charged to the Maas. This work has increased the amount of air reaching the Maas Mine between 15,000 and 20,000 cu. ft. per minute.

The places above the Third Level are all well ventilated. There are a number of contracts above the Fourth Level at the South end of the Maas, that are extremely hot and reduces the efficiency of the men. It was due partly to our effort to improve ventilation in this area, that we have maintained the Fourth Level drift as long as we have. Booster fans are used on the level to provide improved ventilation in the subs but it is not always effective. During the year we purchased two No. 2½B Anaconda Type Sirocco Mine Ventilating Fans and reconditioned two fans purchased from the Armour Mine Equipment. We now have thirteen fans at the Maas Mine.

In anticipation of our having to change the air currents so as to bring the fresh air up through raises from the Fifth Level, in August, No. 5428 Raise which had previously been stopped 70' above the level, was extended to the 60' elevation and a drift driven to the Northeast 100', from the end of which another raise was put up to the elevation of the Fourth Level. The top of this raise is about 20' from the main tramming drift on the Fourth Level and opposite the 400 drift which carries the air coming from the Negaunee Mine.

MAAS MINE
ANNUAL REPORT
YEAR 1935

7. UNDERGROUND (CONT.)

j. Pumping

The number of gallons pumped per minute during 1935, 1934, 1933, 1932 and 1931 are shown below:

Month	1935	1934	1933	1932	1931
January	1,184	1,036	1,039	1,103	925
February	1,146	1,034	1,065	1,156	1,114
March	1,100	1,014	1,049	1,105	1,124
April	1,106	1,014	1,052	1,090	1,149
May	1,110	1,023	1,070	1,085	1,147
June	1,140	1,031	1,071	1,070	1,134
July	1,155	1,075	1,047	1,083	1,135
August	1,129	1,044	1,068	1,079	1,061
September	1,141	1,085	1,070	1,076	1,091
October	1,061	1,080	1,029	1,087	1,115
November	1,126	1,072	1,047	1,089	1,113
December	1,152	1,079	1,050	1,101	1,232
Total average	1,130	1,049	1,055	1,094	1,112

It will be noted from the above tabulation that the average water pumped per minute has increased 81 gallons per minute over 1934. This is due to water draining from No. 7 drill hole and the new area being opened up under the hanging in the Race Course territory at the Fourth Level elevation. We believe that part of this water will gradually drain off and the amount pumped decreased.

8. COST OF OPERATING

a. Comparative Mining Cost

	1935	1934	Incr.	Decr.
Product	363,480	278,985	84,495	
Underground Cost	1.140	1.290		.150
Surface Cost	.131	.138		.007
General Mine Expense	.205	.269		.064
Cost of Production	1.476	1.697		.221
Depletion - Original Cost	.234	.234		
Depreciation-Plant.&Equipt.	.032	.046		.014
Development	.034	.063		.029
Movable Equipt.	.001	.001		
Taxes	.241	.277		.036
Loading and Shipping	.024	.037		.013
Total Cost at Mine	2.042	2.355		.313
Reopening Expense		.009		.009
Total Cost	2.042	2.364		.322
No. of Days Operated	303	273	30	
No. Shifts and Hours	1-8	1-8		
Average Daily Product	1,200	1,022	178	

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

a. Comparative Mining Cost (Cont.)

COST OF PRODUCTION

	1935	%	1934	%	Incr.	Decr.
Labor	.80	54.3	.879	51.8		.079
SSupplies	.676	45.7	.817	48.2		.141
Total	1.476	100.0	1.696	100.0		.220

b. Detailed Cost Comparison

(1) Days and Shifts

Year	Days Worked	Shifts & Hours	Men Employed	Total Days Worked
1935	303	1-8	298	57,745
1934	273	1-8	299	51,618
Increase	30			6,127
Decrease			1	

(2) Wages

There were no wage increases in 1935. In 1934 wages were increased 10% on April 1st.

(3) Comparison of Production

	Production	Average Daily Product
1935	363,480	1,200
1934	278,985	1,022
Increase	84,495	178

(4) Comparison of Number of Men & Wages

	No.Men	No.Days	Amount	Rate Per Day
1935	298	57,745	283,015.41	4.90
1934	299	51,618	240,175.48	4.65
Increase		6,127	42,839.93	.25
Decrease	1			

(5) Tons per man per day

	1935	1934	Incr.	Decr.
Surface	30.48	26.97	3.51	
Underground	7.93	6.75	1.18	
Total	6.29	5.40	.89	

(6) Cost of Production

1935	$535,288.30	Cost per ton 1.476
1934	473,181.35	" " " 1.697
Increase	62,106.95	
Decrease		.221

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

(6) Cost of Production (Cont.)

	TOTAL COST				COST PER TON		
	Labor	%	Supplies	%	Labor	Supplies	Total
1935	290,831.35	54.3	245,578.61	45.7	.800	.676	1.476
1934	245,151.61	51.8	228,029.74	48.2	.879	.817	1.696
Incr.	45,679.74	2.5	17,548.87				
Decr.				2.5	.079	.141	.220

(7) Detail of Accounts

	1935	1934	Incr.	Decr.
Days per week	2 & 3	2 & 3		
Shifts & Hours	1-8	1-8		
Production, Tons	363,480	278,985	84,495	
Avg. Daily Product, Tons	1,200	1,022	178	
Number of Days Worked	303	273	30	

	1935		1934		Increase		Decrease	
Underground Costs	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
1. Exploring in Mine	212.24	.001	413.91	.001			201.67	
2. Dev. in Rock	2,354.13	.006	8,102.40	.029			5,748.27	.023
4. Dev. in Ore	10,107.76	.028	18,874.91	.068			8,767.15	.040
5. Stoping	133,115.84	.366	98,492.86	.352	34,622.98	.014		
6. Timbering	107,043.22	.295	90,822.38	.326	16,220.84			.031
7. Tramming	34,055.23	.094	27,272.71	.098	6,782.52			.004
8. Ventilation	10,600.11	.029	9,478.12	.034	1,121.99			.005
9. Pumping	47,360.12	.130	47,018.19	.169	341.93			.039
10. Compressors & Air Pipes	26,590.85	.073	26,104.21	.094	486.64			.021
11. Back Filling	531.58	.002	1,348.32	.005			816.74	.003
12. Underground Supt.	12,327.38	.034	10,766.66	.039	1,560.72			.005
13. Cave In	40.60		3,264.63	.012			3,224.03	.012
14. Man. Compr. & Drills	1,097.58	.003	589.26	.002	508.32	.001		
15. Scrapers & M.Loaders	18,354.64	.051	8,101.87	.028	10,252.77	.023		
16. Elec. Tram Equipt.	5,608.34	.015	6,628.98	.023			1,020.64	.008
17. Pumping Machinery	4,770.54	.013	2,680.52	.010	2,090.02	.003		
Total Undg. Costs	414,170.16	1.140	359,959.93	1.290	54,210.23			.150
Surface Costs								
18. Hoisting	19,126.97	.052	17,399.22	.063	1,727.75			.011
19. Stocking Ore	6,492.99	.018	4,537.33	.016	1,955.66	.002		
21. Dry House	5,866.37	.015	4,935.12	.018	931.25			.003
22. Genl. Surface	4,760.75	.013	4,230.52	.015	530.23			.002
23. Maint. Hoisting Equipt.	5,645.85	.016	4,033.93	.014	1,611.92	.002		
24. Shaft	1,100.85	.003	663.03	.002	437.82	.001		
25. Top Tram Equipt.	2,393.43	.007	989.29	.004	1,404.14	.003		
26. Docks, T. & Pkts.	1,706.73	.005	1,105.06	.004	601.67	.001		
27. Mine Buildings	589.13	.002	517.45	.002	71.68			
Total Surface Cost	47,683.07	.131	38,410.95	.138	9,272.12			.007

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

(7) Detail of Accounts (Cont.)

	1935 Amount	1935 Per Ton	1934 Amount	1934 Per Ton	Increase Amount	Increase Per Ton	Decrease Amount	Decrease Per Ton
General Mine Expense								
28. Insurance	479.60	.001	209.02	.001	270.58			
29. Mining Engrg.	1,609.76	.005	1,648.92	.006			39.16	.001
30. Mech.&Elec. Engr.	1,215.38	.003	1,178.44	.004	36.94			.001
31. Analysis & Grading	15,253.60	.042	11,903.96	.043	3,349.64			.001
32. Personal Injury	10,364.74	.028	9,803.15	.035	561.59			.007
33. Safety Department	702.24	.002	668.07	.002	34.17			
34. Tel. & S. Devices	1,668.81	.005	1,271.62	.005	379.19			
35. Local & G. Welfare	5,277.00	.013	4,803.11	.017	473.89			.004
36. Sp. Exp. Pens. & All.	7,462.58	.021	9,640.71	.035			2,178.13	.014
37. Ishpeming Office	14,160.00	.042	17,383.04	.062			3,223.04	.020
39. Mine Office	13,273.26	.037	12,094.88	.043	1,178.38			.006
Saranac Invest.	1,968.10	.006	4,536.07	.016			2,567.97	.010
Total Gen.Mine Exp.	73,435.07	.205	75,140.99	.269			1,705.92	.064
Cost of Production	535,288.30	1.476	473,511.87	1.697	61,776.43			.221
40. Taxes	87,489.56	.241	77,223.61	.277	10,265.95			.036
Total Cost	622,777.86	1.717	550,735.48	1.974	72,042.38			.257
Reopening Expense			2,755.80	.009			2,755.80	.009
Supply Invty. Adj.			26.96				26.96	
GRAND TOTAL COST	622,777.86	1.717	553,518.24	1.983	69,259.62			.266

GENERAL

Many of the accounts show a decided increase on account of operating 30 more days in 1935, but on the other hand show a decrease in cost per ton, due to the larger production and better results obtained by the men, reflected in tons per man, being 6.29 in 1935 compared with 5.40 in 1934.

UNDERGROUND COSTS

3. Development in Rock

	Drifting	Raising	Total Feet	Cost Per Foot
1935	231'	145'	376	6.26
1934	541	721	1,262	6.42
Decrease	310'	576'	886	.16

The development of the Fifth Level was completed in 1934.

4. Development in Ore

	Drifting	Raising	Total Feet	Cost Per Foot
1935	449'	1,314'	1,763	5.73
1934	1,296	2,889	4,185	4.51
Decrease	847'	1,575'	2,422	
Increase				1.22

The development of the Fifth Level was completed in 1934.

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

5. Stoping

	Labor	Cost Per Ton	Supplies	Cost per Ton	Total
1935	106,496.30	.293	26,619.54	.073	.366
1934	77,790.53	.279	20,702.33	.073	.352
Increase	28,705.77	.014	5,917.21	.000	.014

The increase in Stoping cost, principally labor, is due to opening new territory and the crushing condition in the area immediately over the Fourth Level.

6. Timbering

	Labor	%	Supplies	%	Total Cost per Ton
1935	66,291.19	61.9	40,752.03	38.1	.295
1934	53,895.52	59.3	36,926.86	40.7	.326
Increase	12,395.67	2.6	3,825.17		
Decrease				2.6	.031

More timbering on account of crushing due to weight on Fourth Level drifts. This retimbering required a larger proportion of labor, as the old timber had to be cut out to make room for the new sets.

7. Tramming

	Labor	Cost per Ton
1935	29,332.39	.081
1934	23,397.47	.084

Increase in labor due to putting on a night tramming crew on the Fifth Level early in 1935. Decrease in cost per ton account of larger tonnage handled.

8. Ventilation

	Cost	Cost per ton
1935	10,600.11	.029
1934	9,478.12	.034
Increase	1,121.99	
Decrease		.005

In addition to the regular operating expense, there were extraordinary charges both years enlarging drifts and raises at the Negaunee Mine account of ventilation for the Maas. Further, two new booster fans were purchased in 1935.

9. Pumping

	Gallons Pumped	Gals. Per Min.	Cost for Power
1935	597,379,626	1,140	38,307.74
1934	550,019,977	1,049	38,767.69
Increase	47,359,649	91	Decr. 459.95

Increase in cost due mosly to the increase in wages effective April 1st, 1934. Decrease in power cost due to 3% tax charged in 1934 and credited in 1935.

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

10. Compressors & Air Pipes

	Cu.Ft. Air Compressed
1935	686,520,000
1934	601,920,000

12. Underground Superintendence
Larger amount due to April 1st, 1934 wage increase and more days worked in 1935. Decrease cost per ton due to greater production.

13. Cave In
During 1934 No. 22 drill hole was put down to determine the thickness of the caping and amount of broken material over the workings. This cost was charged to cave in.

15. Scrapers and Mechanical Loaders
Increase cost and cost per ton due to purchasing four new 15 H.P. Sullivan Hoists, cost $4,550.00 and charging $1,443.00 of second hand Wade Equipment in 1935. There was no new equipment charged in 1934.

17. Pumping Machinery
Increase due to main discharge Y connection in Third Level pumphouse broke January 12th, 1935 costing $900.00 to repair and more general pump repairs.

SURFACE COSTS
18. Hoisting

	Total Ore & Rock	Power Cost	Cost per Ton for Power	Cost per Ton
1935	373,409	13,919.43	.038	.052
1934	295,138	12,559.14	.045	.062
Increase	78,271	1,360.29		
Decrease			.007	.011

Decrease in power charge due to credit given from 3% sale tax collected in 1934. Lower cost per ton account of larger average daily product, reducing labor cost.

19. Stocking Ore

	Tons Stocked
1935	216,635
1934	162,441
Increase	54,194

Increase cost due to more trestle erected in 1935. Erected 22 bents in 1935 and 7 bents in 1934, also more ore stocked.

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

21. Dry House Expense

	1935	1934	Increase
Coal used in Heat.Plant,tons	804	748	56
Cost per ton for Coal	5.16	4.68	.48
Cost of Coal	4,151.34	3,503.81	647.53

Increased cost due mostly to more coal used in Heating Plant on account of 30 more operating days.

23. Maintenance - Hoisting Equipt.
There was one rope changed on South skip in 1935 and one 8' steel lined sheave as compared with one new cage rope and new skip rope on North side, also new 8' sheave in 1934. Increase in 1935 due mostly to more skip, cage and skip road repairs.

25. Maintenance - Top Tram Equipt.
Increase due to more wire rope used, new top tram car built and more general repairs.

26. Maintenance - Docks, Trestles and Pockets
Increase in charge to this account due to construction of two 10 bent branch rock trestles in 1935.

GENERAL MINE EXPENSE

31. Analysis and Grading

	No. Determination	Cost per Determination
1935	47,825	.31894
1934	36,784	.32362
Increase	11,041	
Decrease		.00468

32. Personal Injury

	1935	1934
Compensation Department	840.00	901.17
Hospital Loss	3,428.25	3,281.97
Reserve & Catastrophe, Compensation set up & Medical Service	6,154.01	5,620.01
	10,422.26	9,803.15

36. Special Expense, Pensions & Allowances

	1935	1934	Decrease
Legal	621.00	643.75	22.75
Pensions	6,338.00	8,330.36	1,992.36
Miscellaneous	534.15	666.60	132.45
	7,493.15	9,640.71	2,147.56

MAAS MINE
ANNUAL REPORT
YEAR 1935

8. COST OF OPERATING

b. Detailed Cost Comparison (Cont.)
(7) Detail of Accounts (Cont.)

Analysis of Supplies Used

	1935		1934		Increase		Decrease	
	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton	Amount	Per Ton
41. General Supplies	15,764.32	.043	15,217.02	.055	547.30			.012
42. Iron & Steel	5,303.21	.015	3,649.73	.013	1,653.48	.002		
43. Oil & Grease	1,564.68	.004	1,278.58	.004	286.10			
44. Machinery Supplies	16,914.39	.047	4,776.14	.017	12,138.25	.030		
45. Explosives	22,060.04	.061	18,553.21	.066	3,506.83			.005
46. Lumber & Timber	37,983.48	.104	34,195.95	.123	3,787.53			.019
47. Fuel	4,151.34	.011	3,516.59	.012	634.75			.001
48. Electric Power	84,455.21	.232	84,570.84	.303			115.63	.071
49. Sundries	3,461.36	.010	6,590.30	.024			3,128.94	.014
50. Other Mines & Accts.	88.70		110.64				21.94	
TOTAL	191,569.33	.527	172,237.72	.617	19,331.61			.090

9. EXPLORATIONS AND FUTURE EXPLORATIONS

There were no explorations during 1935 and none contemplated for 1936.

10. TAXES

	1935		1934	
	VALUATION	TAXES	VALUATION	TAXES
Maas Mine	$ 1,305,000	40,246.20	$ 1,225,000	32,832.82
Race Course	800,000	24,667.20	800,000	21,441.84
Adams Strip	190,000	5,858.46	190,000	5,092.44
Stockpile & Equipment	505,000	15,571.17	625,000	16,751.44
Miscellaneous Parcels	9,090	280.31	12,700	340.48
Total Mine	$ 2,809,090	86,623.34	$ 2,852,700	76,459.02
Collection Fees		866.22		764.59
Total Optg.Maas Mine		87,489.56		77,223.61
Tax Rate		3.09		2.6802
Total City of Negaunee Tax		366,574.10		336,047.04
Maas Mine % of City Tax		24.0%		23.0%
Maas Mine Rented Houses	190,800	5,883.28	247,600	6,636.23
Mineral Lands, etc.	19,530	602.22	21,700	660.09
Total Houses & Lands	210,330	6,485.50	269,300	7,296.32
Collection Fees		64.84		72.18
Total		6,550.34		7,368.50

MAAS MINE
ANNUAL REPORT
YEAR 1935

11. ACCIDENTS AND PERSONAL INJURY

	1935	1934
Fatal	0	0
Time Lost, over 4 months	0	1
" " 1 to 4 "	10	2
" " less than 1 month	2	1
Total Accidents	12	4
Number of cases paid compensation for accidents prior to Jan. 1st, 1935,	9	6

There were twelve lost time accidents during the year compared with four for the previous year. Two of these accidents were slight and might have been worked so as to prevent lost time by employing the man on some light job other than his regular occupation. From the description of the accidents given below, it will be noted that they can be classified as Trade Risks and as carelessness on part of the injured person.

There were 9 cases paid compensation in 1935 for accidents prior to January 1st, 1935. Of these, the payments on 5 have been completed, leaving 4 old cases to which we will have to add 3 that will carry over from 1935, making a total of 7 cases still pending on January 1st, 1936.

The following is a list of lost time accidents with brief description:-

Date of Accident	Name of Injured Man	Weeks Lost	Compensation Paid to 12/31/35.	Description of Accident
1/3/1935	Otto Hanninen	2⅛	$27.00	Hanninen, miner, was picking a hitch for a gin pole for hanging the scraper block. A chunk glanced off his pick and hit his left eye.
2/20/35	John Warnstrom	1⅛	$9.00	Warnstrom, miner, and his partner were scraping dirt from their old slice. The block was chained to a leg near the breast. He was standing in the slice just opposite the leg to which the block was fastened. His partner was operating the scraper. This leg, which was undermined, was pulled out by the scraper and fell over, striking Warnstrom on the instep of his left foot.

MAAS MINE
ANNUAL REPORT
YEAR 1935

11. ACCIDENTS AND PERSONAL INJURY

Date of Accident	Name of Injured Man	Weeks Lost	Compensation Paid to 12/31/35	Description of Accident
4/30/35	Alfred Laak	17½	$315.00	Laak, miner, was helping to hoist timber. A piece of timber had been hoisted to the sub level and jammed between a leg and a prop over the raise. The raise timber was crushed, making it difficult to work. The strain was kept on the rope. Laak worked at one end and his partner at the other. The timber was finally released and the strain on the rope swung it in Laak's direction and caught his finger between it and the prop.
5/13/35	Jacob Hakka	6-5/6	123.00	Hakka, timberman, was one of a crew planking the ore compartment of a raise. He and Victor Maki were sending up the plank from the 3rd level. Hakka was guiding the plank while Maki was pulling it up the raise. On account of the length of the plank, it wedged and in getting it loose, Hakka caught his finger between the plank and edge of platform in front of raise.
8/29/35	Adolph Laitinen	11-5/6	213.00	Laitinen, miner, was standing on a staging in the chute compartment of the raise and picking loose from the back, when a chunk came down and struck him on the left foot. The raise was cribbed within a few feet of the back. His partner was drilling a new cut over the ladderway. The formation was flat and the drilling had loosened ore in the back, over ore compartment. Laitinen was trimming the back, getting ready to drill when the accident happened.
8/31/35	Lee Sandstrom	5	72.00	Sandstrom, miner, was driving a 6 inch spike into a sprag for bracing the set. His axe missed the spike and he hit the little finger of his left hand. He worked until September 18th. Was first examined by the doctor on September 16th when an x-ray disclosed a fracture.

MAAS MINE
ANNUAL REPORT
YEAR 1935

11. ACCIDENTS AND PERSONAL INJURY

Date of Accident	Name of Injured Man	Weeks Lost	Compensation Paid to 12/31/35	Description of Accident
9/28/35	James Langdon		$50.40	Langdon, heating plant fireman, on his way to work followed a path leading across a rill of an old Maas stockpile. He tripped over a 5/8" bolt bent over in line of the path. This bolt had been bent back out of the way and someone in trying to pull it out was unsuccessful, but left it in line of the path. Langdon returned to work October 31, 1935 and worked for several weeks. On November 24th, while walking down the street in Ishpeming, he says he noticed a click in his knee and that he went suddenly lame. It is possible that he may have stumbled or slipped, as the streets were very icy on that particular day. He was taken to the Hospital on November 25th and the x-ray showed a bad fracture of the right patella bone. As Langdon is 68 years of age, this will probably be a long drawn out case.
9/30/35	Rasmus Christiansen	10-5/6	$171.60	Christiansen, top tram engineer, was working night shift. The electric lights on the West trestle went out and he tried the fuses in the shanty, finding them o.k. He went out to try the light bulbs. When he was returning to the shanty, he fell in the pocket onto a pile of ore, dislocating his left shoulder and fracturing the humerus of his left arm.
11/6/35	Thomas Graham	9½	$165.30	Grayham and his partner were hoisting timber from the Fifth Level with an air tugger. The ground back of the puffer is jasper and was badly broken up. These men had called this condition to the attention of the shiftboss and were told to see that it was properly lagged. Instead of making their place safe and then hoisting timber, they took a chance and while hoisting, a slab fell from the side of the drift, striking Graham's left hand, which was resting on the puffer. Bad lacerated wound of left hand.

MAAS MINE
ANNUAL REPORT
YEAR 1935

11. ACCIDENTS AND PERSONAL INJURY

Date of Accident	Name of Injured Man	Weeks Lost	Compensation Paid to 12/31/35	Description of Accident
11/23/35	Wm. Luipakka	3-2/3	$45.23	During the night shift the door of one of the measuring pockets had hung up and it could not be raised any higher with the air cylinder. The timbermen tried to jar it loose by attaching a rope to the door and the other end to Luipakka's motor. He gave several jerks and then was told to give slack. Luipakka got off the motor straddling the rope, when the door dropped, pulling the rope tight and throwing Luipakka into the air, causing burns of inner surface of thighs due to friction of moving cable.
11/29/35	Nick Aho	1-1/3	$6.00	Aho was helping to raise a cap in No. 23 contract and put his right hand on top of the leg to brace himself and cap was lowered on his hand, mashing the right index finger.
12/4/35	Wm. J. Roberts		$18.00	Roberts and his partner had hoisted and stored two pieces of a set of timber in their drift. They had hoisted the third and were pulling it in to pile it on top and between the other two pieces. Bergeson was operating the hoist and Roberts followed the timber in. Instead of riding on top of the first two pieces, it caught and swung around in Robert's direction, who was following alongside of it, striking the calf of his right leg, fracturing the fibula.

12. NEW CONSTRUCTION AND PROPOSED NEW CONSTRUCTION

There was no new construction during the year 1935 and we do not contemplate any at this time in 1936.

13. EQUIPMENT AND PROPOSED EQUIPMENT

a. Steam Shovels

The No. 16 Shovel was reconditioned at the General Shops at Ishpeming and returned to the Maas Mine in April when shipments were started. It was used to load the Maas Grade from the West trestle. After the season was completed, it

MAAS MINE
ANNUAL REPORT
YEAR 1935

13. EQUIPMENT AND PROPOSED EQUIPMENT

a. Steam Shovels (Cont.)

was returned to Ishpeming for winter storage.

The No. 44 Shovels, an 85C Model, which had been stored at the Maas Mine, was gone over early in April and minor repairs made. It was used to load ore from the steel trestle. Due to its size, it can take a wider cut and load more cars per day than the No. 16. It also can cut up higher on the pile and is not so readily buried by caves of the pile.

During the fall, the No. 45 Shovel was shipped to the Maas Mine. This is a large steam shovel on catapillars. It was completely overhauled as it was set up so it will be in first class condition this coming season. This shovel with catapillars, can be operated with a smaller number of men in the pit crew and will be quite an advantage for loading ore from the steel trestle where several different grades are stockpiled, as it can be cut in at any point within a short space. With a railroad type shovel, track conditions govern this, depending on the sharpness of the curve.

b. Stockpile Trestle

A new trestle was constructed from the end of the West permanent trestle. It extends to the Southwest a short distance and then paralells the old pile of Maas ore stockpiled during 1933, 1934 and 1935. This trestle is 22 bents long and permits dumping more than one grade if necessary. Next season arrangements will have to be made to load from the North side of the old pile.

c. Scraper Hoists

The hoists on hand December 31st, 1935 were as follows:

Ingersoll-Rand	15 H.P. Electrics	9
" "	10 " "	3
Sullivan	25 " "	2
"	20 " "	1
"	15 " "	19
"	7½ " "	1
"	6½ " "	4
Total Electric Hoists		39

Ingersoll-Rand Air Hoists, Rebuilt to hand timber (single drum)	9
Ingersoll-Rand Air Hoists, double drum	7

There were 36 contracts employed at the end of the year of which one was transferring their dirt, and one raising and using a single drum air hoist. The 35 contracts engaged in mining or drifting require 36 hoists, making it necessary to use the two 25 H.P. and two of the 6½ H.P. hoists. The 25 H.P. machines are too large and cumbersom to use in crushing territory and will have to be replaced when we start a new sub level below the 401' elevation

MAAS MINE
ANNUAL REPORT
YEAR 1935

13. EQUIPMENT AND PROPOSED EQUIPMENT

c. Scraper Hoists (Cont.)

where they are now in use. We have two 15 H.P. Sullivan Hoists on order for delivery February 1st to replace these large machines. We will have to continue to use two of the smaller hoists, which are not very efficient, until later in 1936, when we should order several more 15 H.P. type.

During the year we had six more of our double drum air hoists changed to single drums for handling timber up raises, making a total of nine. There are seven more that can be converted as the General Shop can do the work.

14. MAINTENANCE AND REPAIRS

There were no extraordinary repairs made during the year except in the case of the "Y" casting in the main pump discharge line which was explained fully under delays. All equipment has been kept in good working condition and only minor repairs and replacements made.

The cage rope, which was new in March 1934, was turned end for end on May 5th and the cage changed on September 15th. The cage had previously been through the shop and completely overhauled.

The skips have been changed several times during the year. On Sunday, August 4th, the South skip rope was changed. The one taken off was an Athens used rope and was on from December 7th, 1934 until August 4th, 185 days, handling 110,500 tons. Another used Athens rope was put on.

During the summer the cage and North skip head sheaves in the shafthouse were renewed.

15. POWER

There was only one interuption of power service of any length of time during the year. Power is one of the supply items used in connection with the mine on which the 3% sales tax has been exempted.

The following is the rate charged per K.W.H. by months during 1935:

January	$.0146
February	.0142
March	.0140
April	.0140
May	.0138
June	.0138
July	.0140
August	.0140
September	.0140
October	.0144
November	.0144
December	.0144
Average	$.01413

MAAS MINE
ANNUAL REPORT
YEAR 1935

15. POWER (CONT.)

The auxiliary steam turbine plant at the Maas Mine was not operated during the year.

17. CONDITION OF PREMISES

There were no improvements of the grounds around the mine. A man was employed 3 days a week to cut the grass and keep the shrubs weeded and trimmed.

18. NATIONALITY OF EMPLOYEES

As to Parentage	1935	%	1934	%
English	89	29.6	92	29.7
Finnish	117	38.9	123	39.8
Italian	29	9.6	29	9.4
Swedish	22	7.3	23	7.4
Germans	9	3.0	8	2.6
Crotians	1	.3	1	.4
Norwegians	4	1.3	3	1.0
Danes	3	1.0	3	1.0
Irish	5	1.7	6	1.9
French (Canadian	17	5.6	18	5.8
Americans	5	1.7	3	1.0
Total	301	100.0	309	100.0

	Total		American Born		Foreign Born	
As to Birth	1935	1934	1935	1934	1935	1934
English	89	92	43	44	46	48
Finnish	117	123	47	51	70	72
Italian	29	29	7	9	22	20
Swedish	22	23	14	17	8	6
German	9	8	7	6	2	2
Crotians	1	1			1	1
Norwegians	4	3	3	2	1	1
Danes	3	3	2	2	1	1
Irish	5	6	5	6		
French (Canadian)	17	18	17	18		
Americans	5	3	5	3		
TOTAL	301	309	150	158	151	151
Percentage			50%	51%	50%	49%

19. MAAS CRUSHER

A crew was organized early in April to make minor repairs and assist in putting the plant in shape for operation. The first ore put through the crusher was on April 11th and it operated intermittently throughout the season, working only a few days per month, until October 31st. A total of 56 shifts were worked compared with 37 for 1934. The average daily tonnage put through the plant was 1,502 tons. Besides the operating days, about 7 days were

MAAS MINE
ANNUAL REPORT
YEAR 1935

19. MAAS CRUSHER (CONT.)

spent in cleaning up the spill on the tracks, under the pan conveyor and along the belt conveyor runway.

Ore from the Cliffs Shaft, Morris, Lloyd, Maas and Morris for the Inland Steel Company was crushed during the 1935 season. The tonnage from each mine was as follows:-

	Tons		Tons	
Mine	1935	1934	Incr.	Decr.
Cliffs Shaft	4,045	7,986		3,941
Lloyd	19,882	22,671		2,789
Morris	36,586		36,586	
Maas	23,577	1,690	21,887	
Negaunee		973		973
Total	84,090	33,320	50,770	
Morris-Inland Steel		6,062		6,062
Total	84,090	39,382	44,708	

ATHENS MINE
ANNUAL REPORT
YEAR 1935

1. GENERAL:

The Athens Mine operated on a two day per week schedule from January 1st to February 11th when the working time was increased to three days per week which schedule was continued for the balance of the year. Two crews of men were employed the same as in 1934. On the two day schedule the mine operated four days each week and on the three day schedule six days per week. The six day operation was a great improvement over the four days as two idle days were eliminated. This is of particular benefit at the Athens Mine due to the character of the ore and the heavy pressures. The mining of each local area is accelerated, reducing repairs to connecting drifts, raises, traveling and ventilation roads.

During the past year mining operations have been largely concentrated in the 6th level territory due to the gradual transfer of mining gangs from the 8th level. Extensive development work has been underway all year on the 6th level to open new territory for ore production on Mitchell Lease Lots 8 and 9 to provide places for the gangs moved from the 8th level. Satisfactory costs were impossible due to the heavy development expense in addition to which considerable expense was incurred in making other necessary improvements in the mine. The improvements that were completed covered stripping the transfer raises at the shaft from the 6th to 8th levels to enlarge them to 8 ft. in diameter and enlargement and cleaning of the main sump on the 10th level. In addition a start was made on a program of putting up airway raises in rock between the levels from the 10th to 6th levels and a new airway raise in ore from the 6th to 4th levels. The enlargement of airways will not be completed until late in 1936.

The increase in efficiency at the Negaunee Mine due to extensive enlargement of airways is ample justification for the expenditure of the considerable sum involved in the rapid completion of this work.

It is gratifying to report the success attending the pumping of the Breitung shaft of the Jones & Laughlin Steel Company in causing a reduction in the amount of water pumped at the Athens Mine. During the year the gallons of water pumped at the Athens was reduced from a maximum of 369 gallons per minute in January (before pumping at the Breitung started) to 249 gallons per minute in December. The enlargement and cleaning of the sump on the 10th level (the main pumping plant) together with the decrease in water cut the pumping time, late in December, down to two shifts in 24 hours. There will be a material saving effected in both labor and supply cost (current) which will be fully reflected in the 1936 costs although, due to less water, the cost of pumping was lower in the latter half of 1935.

Shipments from stockpile increased in 1935 - they were 171,674 tons as compared to 77,393 tons in 1934. The ore under one steel trestle was removed and nearly all from the other so there is now ample room available for stocking even if production is materially increased.

ATHENS MINE
ANNUAL REPORT
YEAR 1935

1. GENERAL: (Cont'd)

The bad effects of the two idle periods and the low schedule of operations since 1931 have and will continue to increase repair costs for some time in the future. The lack of circulation of air during the idle periods accelerated the rate of rotting of timber throughout the mine and during the past year a large crew of men have been engaged in replacing rotted timber on the levels and in the raises. Nearly every raise in use has had some repairs, from partial recribbing to complete replacement of all the cribbing. Production decreases every time a raise is out of commission for repairs so that to the actual cost of repairs must be added the extra cost due to decrease in production.

During 1935 there were three lost time accidents as compared with one in 1934. Fortunately the accidents did not result in severe injuries and all of the men should return to work with no more than four or five months lost time. Two of the accidents occured to men in putting up raises which work in this mine is very hazardous due to loose, slabby ground. All three accidents occurred in connection with development work and not in actual mining operations. A number of meetings of the foremen with the Superintendent were held during the year at which accidents, mining standards and safety were discussed. In these small groups the foremen talk freely and much benefit results from the open discussions of problems connected with safety work. There were also general safety meetings of the foremen from all the mines. The announcement of cash prizes to be given in 1936 for safety records excited great interest at the mine and it will doubtless prove a powerful factor in causing the men to voluntarily follow the safety rules and regulations. The men are unquestionably more alive to the hazards of their occupation and willing to cooperate in the elimination of unsafe methods of doing work. Only through a spirit of cooperation can accidents be avoided. Many hazards exist in the mine and unceasing vigilance is necessary to avoid them.

2. PRODUCTION, SHIPMENTS & INVENTORIES:

a. Production by Grades:

	1935	1934	Increase
Athens Ore	123,842	109,116	14,726
Mitchell Lease Ore	68,692	53,590	15,102
Total Ore	192,534	162,706	29,828
Rock	13,326	3,751	9,575
Total Hoist	205,860	166,457	39,403

b. Shipments:

Grade of Ore	Pocket Tons	Stockpile Tons	Total Tons	Total Last Year
Athens Ore	55,429	317,161	192,590	109,503
Mitchell Lease Ore	34,737	34,513	69,250	29,518
Total	90,166	171,674	261,840	139,021
Total Last Year	61,688	77,333	139,021	
Increase	28,478	94,341	122,819	

ATHENS MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION, SHIPMENTS & INVENTORIES: (Cont'd)

c. Stockpile Inventories:

Grade of Ore	Dec. 31, 1935	Dec. 31, 1934	Decrease
Athens Ore	50,704	119,452	68,748
Mitchell Lease Ore	33,148	33,706	558
Total	83,852	153,158	69,306

d. Division of Product by Levels:

	1935		1934	
6th Level	127,797	66.4%	79,700	48.9%
8th "	64,737	33.6%	82,600	50.8%
9th "	0		406	.3%
Total	192,534	100.0%	162,706	100.0%

e. Production by Months:

Month	Athens	Mitch.Lease	Total	Rock
January	9,176	3,525	12,701	262
February	9,411	4,694	14,105	533
March	11,647	5,593	17,240	230
April	11,543	6,548	18,091	501
May	11,950	5,484	17,434	1,155
June	8,723	6,453	15,176	1,222
July	10,192	5,838	16,030	1,655
August	10,745	6,659	17,404	1,571
September	10,133	5,095	15,228	1,541
October	10,802	6,498	17,300	1,770
November	9,622	5,762	15,384	1,506
December	9,898	6,543	16,441	1,380
Total	123,842	68,692	192,534	13,326
Total 1934	109,116	53,590	162,706	3,751
Increase	14,726	15,102	29,828	9,575

The tonnage of rock hoisted in 1935 was the largest in many years, being approximately four times the amount hoisted in 1934 and six times the amount in 1933.

f. Ore Statement:

	Athens	Mitch.Lease	Total 1935	Total 1934
On Hand Jan. 1, 1935	119,452	33,706	153,158	129,473
Product for Year	123,842	68,692	192,534	162,706
Total	243,294	102,398	345,692	292,179
Shipments	192,590	69,250	261,840	139,021
Balance on Hand	50,704	33,148	83,852	153,158
Increase in Product			29,828	
Decrease in Ore on Hand			69,306	

ATHENS MINE
ANNUAL REPORT
YEAR 1935

2. PRODUCTION, SHIPMENTS & INVENTORIES:

g. Delays:

There were no delays in 1935.

h. Delays from Lack of Current:

There was a delay of one hour on February 15th and one and one-quarter hours on April 29th due to lack of current but the delays did not reduce the product.

3. ANALYSIS:

a. Average Mine Analysis on Output:

	1935				1934			
Grade	Tons	Iron	Phos.	Silica	Tons	Iron	Phos.	Silica
Athens Ore	123,842	61.44	.132	5.75	109,116	61.26	.120	6.03
Mitchell Lease	68,692	61.39	.132	5.98	53,590	61.28	.125	6.41

b. Average Analysis on Straight Cargoes:

	Mine			Lake Erie	
Grade	Iron	Phos.	Silica	Iron	Moisture
Athens Ore		None			None
Mitchell Lease		"			"

c. High Sulphur Ore:

No high sulphur ore was encountered in 1935.

4. ESTIMATE OF ORE RESERVES:

a. Developed Ore:

Assumption: 12.75 cubic feet equals one ton
10% deducted for rock
10% deducted for loss in mining
Percentage of Bessemer equals 0%.

4th Level and above	966,385 tons
4th " to 6th Level	1,687,166 "
6th " " 8th "	1,044,872 "
8th " " 9th "	403,015 "
9th " " 10th "	354,812 "
Below 10th Level	49,236 "
Total developed ore Dec. 31, 1935	4,505,486 "

The estimate a year ago was 4,772,512 tons, the decrease in 1935 was 267,026 tons or 74,492 tons more than the output for the year. The reduction in the estimated ore reserves was due to the large mass of paint rock and slate found on and above the 6th level which proved to be larger than had been anticipated.

ATHENS MINE
ANNUAL REPORT
YEAR 1935

4. ESTIMATE OF ORE RESERVES: (Cont'd)

b. Prospective Ore:

All ore in the mine is developed.

c. Estimated Analysis:

Ore Reserves: Approximate Expected Natural Analysis:

Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
52.80	.115	5.60	.400	2.60	1.00	.850	.011	1.40	13.00

Ore in Stock: Average Natural Analysis:

Tons	Iron	Phos.	Silica	Mang.	Alum.	Lime	Mag.	Sul.	Igni.	Moist.
83,852	53.76	.113	5.16	.370	2.75	.620	.730	.010	1.32	12.21

5. LABOR AND WAGES:

a. Comments:

(1) Labor:

There was no labor turnover in 1935. The only loss of time by men was on account of sickness or accidents. The general feeling has been good since the three day schedule went into effect last February but quite naturally the men hope for at least a four day working schedule in 1936. Efficiency is above normal due to the surplus of available labor in the district. The number of employees was increased in 1935 on account of the heavy development and repair program.

b. Comparative Statement of Wages and Product:

	1935	1934	Increase	Decrease
PRODUCT	192,534	162,706	29,828	
No. Shifts and Hours	1 8-hr.	1 8-hr.		
AVERAGE NO. MEN WORKING:				
Surface	47	43	4	
Underground	166	150	16	
Total	213	193	20	

The increase in surface employees is due to including the hours worked at the General Shops for the Athens Mine. The underground crew was increased on account of the development work.

AVERAGE WAGES PER DAY:				
Surface	4.14	4.03	.11	
Underground	4.88	4.77	.11	
Total	4.70	4.58	.12	
AVERAGE WAGES PER MONTH:	(Based on mine payroll including Captain & Clerks)			
Surface	70.29	62.66	7.63	
Underground	71.83	61.85	9.98	
Total	71.49	62.03	9.46	